THREE ESSAYS ON THE ECONOMICS OF EDUCATION IN POST-CONFLICT SETTINGS: THE CASE OF TIMOR-LESTE

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Author's declaration

I hereby declare that this thesis has not been submitted, either in the same or different form to this or any other University for a degree.

Signature:

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Abstract

This thesis seeks to contribute to the knowledge of the economics of education in post-conflict, by proposing an economic analysis of such a setting as a hybrid socio-economic environment, where conflict, despite having ended, has still an impact. It uses an applied economics approach to analyse demand for primary and secondary education and one of the main economic drivers of their demand, returns to education. The focus of study is the post-conflict country of Timor-Leste.

In this analysis it proposes and tests economic mechanisms through which conflict may have impacted the returns to education observed in post-conflict Timor-Leste, finding evidence of two significant channels: reduction of productivity and scarcity of qualified human resources. In support of this analysis, it builds a dataset with a novel indicator of political control during conflict that applies in the empirical analysis of returns to education.

In the next chapter it seeks to establish evidence of medium-run impacts of conflict on the demand for primary education in Timor-Leste, proposing and testing an empirical methodology to do so.

Finally, it proposes and analyses an empirical model of the demand for secondary education in Timor-Leste that integrates the hypothesis of medium-run impacts of conflict.

In the process it finds evidence suggesting that, while some of the channels negatively impacted by conflict significantly affect demand for education, a medium-run positive effect might exist, particularly in the form of higher preferences for secondary education among those that experienced more violence during the conflict. Less robust findings of equally positive medium-run effects of conflict are found in the demand for primary education.

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Acknowledgements

Inconfidências

São nossas as armas, são vossas as guerras
São nossos os lucros, são vossas as mortes
Fazemos dos homens uns meros bonecos
Deixando que pensem agir como homens.

As mãos que percutem gatilhos são vossas
Razão que comanda ninguém reconhece,
Pois uns se escudam na força dos votos
E outros a capa de fraudes alegam.

Vendendo a ambos, nos crescem os lucros.
Riquezas, que tendes, compramos barato.
Dos ganhos que temos nos damos ao luxo,

De dar-vos esmolas que, meras migalhas,
Não passam de restos e são um produto
Da fome que tendes, por guerras travadas.

Secrets disclosed[1]

Ours are the weapons, yours the wars
Ours the profits, yours the killings
We turn all men into mere dummies
While letting them think they're acting like men

Yours are the fingers that pull the triggers
No-one acknowledges reason's command
For some hide behind the power of votes
While others claim the veil of fraud

By selling to both our profits swell
What wealth you have, we'll buy on the cheap
Our generous margins allow us the luxury

Of giving donations that, being mere crumbs,
Are no more than leftovers, and the result
Of the hunger you feel, from the wars that you fight.

Américo Goulão dos Santos
(08-05-1944 - 13-06-2015)
Estarás sempre comigo!

[1] A special thanks to Alex Shankland for reviewing my weak attempt of a translation.

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Acronyms

ABRI	Indonesian Army
ADB	Asian Development Bank
BPS	Indonesian Bureau of Statistics
CAVR	Timorese Truth and Reconciliation Commission
DFID	Department for International Development, United Kingdom Government
DNE	Timorese National Statistics Bureau
EFA	Education for All
FALINTIL	Timorese Resistance Military Branch
FCAS	Fragile and Conflict Afflicted States
FOKUPERS	Forum Komunikasi Untuk Perempuan Timor Lorosae
FRETILIN	Frente Revolucionária de Timor Independente
g7+	g7+ group of conflict afflicted countries
GERTIL	Grupo de Estudos de Reconstrução – Timor-Leste
GNI	Gross National Income
HP	Binomial Probit with Selection (Heckman-Probit)
HRDAG	Human Rights Data Analysis Group
ICT	Information and Communications Technology
ILO	International Labour Organization
INE	Portuguese Bureau of Statistics
IQ	Intelligence Quotient
IV	Instrumental Variables
MDGs	Millennium Development Goals
NGO	Non-Governmental Organization
OLS	Ordinary Least Squares
OECD	Organization for Economic Co-operation and Development
R&D	Research and Development
SDG's	Sustainable Development Goals
RPW	Rural Public Works
TLSLS	Timor-Leste Survey of Living Standards
TVET	Technical Vocational Education and Training
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UPE	Universal Primary Education
USD	United States Dollars
WFP	World Food Programme

Introduction

The importance of Education is one of the strongest areas of consensus found in the international debate and agenda about Human Development. Education is perceived as a societal investment, with effects on human capital formation and economic growth and also on other social common goods. The correlation of higher schooling with higher performance in indicators relating to human development is well established and emphasized by many studies, from Lucas (1988), Mankiw et al. (1992) and Barro and Lee (1994) to Gregorio and Lee (2002), from Breierova and Duflo (2004) to Cutler et al. (2006), as reviewed by Barro and Lee (2013). The contribution of education to growth is heterogeneous and each level of school attainment contributes differently to the path of economic growth in each country. Papageorgiou (2003) found that primary education contributes substantially to a higher output production but, particularly in developing countries, has a very limited contribution to research and development (R&D) adoption. Conversely, post-primary education, including attainment at the secondary level, contributes less to production directly but is decisive as a contributor to R&D. Finally, the contribution goes beyond economic growth. Curry and Brand (2014), reviewing the literature on the effects of education, found evidence of the importance of schooling attainment on labour market outcomes; social status; physical and mental health; marriage and fertility; civic participation; and social attitudes.

These studies allowed for a strong worldwide agreement that has contributed to include education as a main component of the Millennium Development Goals (MDGs). Previously, in 1990 at Jomtien, the Education for All (EFA) initiative was launched, establishing the goal of Universal Primary Education (UPE) that became inscribed in the MDGs. As with the MDGs, the new Sustainable Development Goals (SDG's)

establish a set of targets for education. Beyond universal primary education, the aim is now to also guarantee that all children have access to free, equitable and quality secondary education.

The international commitment has been strong and evolving. Following Psacharopoulos (2006), World Bank policies on education evolved from a focus on education as a source of professional training and a focus on manpower planning, from 1963 to 1999. Then, the priorities were turned to the promotion of basic education with a focus on girls and the poorest and the improvement of teaching and learning processes focusing on early child development. At this time there was also an emphasis on the promotion of ICT's in open and distance learning; curriculum improvement; decentralization; and the entry of non-government providers. A new priority was added then, with an increased attention given to the private sector and on the need for Technical Vocational Education and Training (TVET). A systemic approach has been proposed, to be applied to what the World Bank identifies now as key areas: "*working in fragile situations; involving the private sector in education; promoting gender equality; and linking education systems to labour markets.*" (World Bank, 2011:42). Clearly the focus of this approach is on the supply side of the education economy: the provision of services.

In his review, Psacharopoulos also shows another priority. Aid to primary education consistently rose in importance, from 2.7% of lending in the sector to 35.6% (Psacharopoulos, 2006) during the period 1960 to 1999 and has been maintained at around 30% in the current decade (World Bank, 2013a). Fredriksen (2008), however, looking at international assistance to development, argued that the focus of the Education For All targets needed to expand beyond primary education and also beyond only providing access and promoting enrolment. The report also recommended that higher priority should be given to post-primary education.

The priority given to education, as set by multilateral donors, was translated into policies of poorer countries' governments. National commitments toward education have manifested themselves beyond the letters and words of statements, and are evidenced in positive achievements. Most recent statistics suggest a significant improvement in primary school enrolment in developing countries, reaching 90% in 2010, up from 82% in 1999 (UNESCO, 2011).

However, this rather positive story does not seem to resonate in conflict affected countries. Losses in education are among the legacies of conflict. In its Education for All 2011 Global Monitoring Report, especially dedicated to conflict, UNESCO (2011) reported the dire situation in *Fragile and Conflict Afflicted States (FCAS)*. Although it only reported 35 countries as FCAS, these encompassed in 2011, 42% of all children of primary school age out of school, making a total that surpassed 28 million. More recent evidence is reported by Winthrop and Matsui (2013), finding that a child living in a low income "*fragile state*" is three times as likely to not attend school than a child living in a peaceful low income country.

The challenges of fragility

Cammack et al. (2006) looking at the United States, United Kingdom and Germany - key international assistance donors - reviews how state fragility is described. "*Fragile states*" demonstrate a weak functionality in the provision of the conditions for security and wellbeing of their citizens (including education); they generate or are inadequately able to cope with poverty, violent conflict and other forms of national and international violence and crime, refugees, disease and/or environment degradation[2]. In a recent guideline document on fragility assessment (ADB, 2014), the Asian Development Bank

[2] Finally, Cammack et al. (2006) note that those states with whom donors find it difficult to partner can also be qualified by them as fragile.

describes the term in a fundamentally similar way as referring to failure to: provide basic social services (considered to be health, education and security); uphold the rule of law; and provide for sustainable sources of income to enable the population to move out of poverty.

The fragilities of conflict afflicted countries are also manifested in the labour market, as was reviewed in the Jobs after War report (Date-Bah, 2003), commissioned by ILO. In it, Khshnamurty (2003:56) highlights how, after a conflict, the "*labour force lacks education and skills, and the mechanisms for providing these have also broken down*". It also refers to the way in which vocational training centres and schools tend to be damaged by conflict. Downstream of education, and looking at the example of the Timorese labour market immediately after independence, it refers to an unemployment rate of around 75%. As Khshnamurty (2003:60) stressed:

> *'It cannot be emphasized strongly enough that employment is one of the immediate needs of a post-conflict situation and providing immediate work opportunities must be an integral part of the humanitarian response to the post-conflict situation to contribute to human security'*.

It is, however, not just the employment opportunities, or lack thereof, that characterize a post-conflict labour market. As Hopkins (2003:439) reminds us, a post-conflict setting witnesses "*the use of international contracting services, expatriate labour and the introduction of new currencies - what could be described picturesquely as a modern-times 'Gold Rush' '* –[that] *can have a negative effect on future socio-economic development of the country concerned and, in particular, the labour market.*" Hopkins also reminds us that it takes time for education to generate national human resources able to respond to the needs of post-conflict development: "*schooling takes at least eleven years before even higher secondary graduates are formed*" (Hopkins, 2003:429). Hopkins looked at Timor-Leste during the UN's transitional administration (1999-2003)

describing it as one where the challenges of the post-conflict labour market were more striking and highlighting the need to raise human capital in the new, post-conflict, country.

In a post-conflict, fragile country - as Winthrop and Matsui (2013) noticed - the role of education extends beyond its contributions to growth and poverty reduction. It has a role in shaping individual and collective identities, the sanctioning of norms and behaviours and the promotion of individual agency. Chauvet and Collier (2008) state that the provision of social services such as education signals a more equal spreading of the peace dividend. Families, through the act of sending their children to school, become part of the peace dividend process. Those authors advocate looking at education also as an instrument of societal transformation, stating that poor governance and policies can be the consequence of poorly educated citizens. They argue that secondary education contributes to the countries' capacity to engage in reforms, stating that there is a need for a critical mass of well-educated people in order for a reform to start, even if it does not influence the sustainability of reform once it is underway.

In a post-conflict setting, however, it is also important to acknowledge that education and its drivers, as UNESCO (2011) points out, can also - despite their potential in the construction of peace - be an instrument to reinforce social divisions, intolerance and prejudice, and thus intensify the risks of relapse. The development of education, as Rose and Greeley (2006) suggest, may, therefore, be motivated by four different types of agendas. These are, first, a security agenda that stresses the potential positive and negative uses of education its role in national identity formation and social cohesion, the risks of disaffected youth and the role of religious schooling. Second, there is a humanitarian agenda that stresses the need of community engagement and of schools as safe spaces. Third, there is the EFA agenda that, as a rights-based approach, seeks to

address exclusion and to build citizenship, tolerance and peace. Finally, there is the MDGs agenda that focuses on growth, poverty reduction and the primary schooling targets. Irrespective of the agenda, there is a clear need to address education in post-conflict situations as a priority, even more than in other developing settings and to address the specificities of the setting in which the agenda is to be put in place.

An understanding of drivers and constraints is required in order to assure a post-conflict policy that fosters the potential positive effects of education, while preventing its potential risks. A policy that fails to do so may risk falling into the trap highlighted by Psacharopoulos (2006:336):

> *'Attempting to implement nice-sounding international resolutions can divert resources away from where the need is. (...) [I]t is high time that international organizations stopped using round numbers for setting their goals, e.g. 1970 for universal primary education in Africa, 2000 for education for all, 2005 for gender parity, and 2015 for redefined education for all. (...) By way of summary, therefore, concrete, small and gradual are beautiful. Grand visions and targets are not.'*

A contextualized analysis of education, focusing on the reality of post-conflict settings is then needed to allow for small, gradual and concrete policies to address the challenges faced in this arena. This is also stressed by Rose and Greeley (2006), as they affirm the need to look at education as a long-term project, requiring long-term planning.

To support such a planning process, a deeper understanding of education in a post-conflict setting - namely one that focuses on the economic aspects of its nature - should look into both supply and demand for education. However, most of the attention, so far, has been focused on supply. This was already clear in the review by Psacharopoulos (2006), but it can also be read in articles that specifically addressed education in post-conflict settings. Chauvet and Collier (2008) proposed that in order to create the growth

of educational provision in fragile states there needed to be a resort to private sector initiatives as the government may not have enough resources and may not give enough priority to educational investments. They recommended, however, public investment in schools that would support the building industry for reconstruction and in high quality education for the children of diaspora. Finally they recommended the creation of a new bureaucratic structure, an Independent Service Authority. Their proposal may miss, however, the financial and capacity constraints of governments in conflict afflicted settings and the lack of depth of the post-conflict economies as highlighted by Khshnamurty (2003). Rose and Greeley (2006) suggested a focus on both non-formal livelihood education for out-of-school youth, and on secondary and higher education. Winthrop and Matsui (2013) proposed a greater degree of coordination and eventual integration between both humanitarian and disaster risk reduction aid and development aid on education. These proposals, however, can only be supported and analysed against the backdrop of a deeper knowledge of demand for education in a post-conflict setting and the drivers behind that demand. Yet, that side of the economy of education in post-conflict settings appears under-researched.

Understanding the drivers of demand for education in post-conflict

A wide body of research has been consolidated on demand for education. Starting from the works of Mincer (1958), Schultz (1961), Becker, (1962) and Ben-Porath (1967), the economic problem of demand for education has been constructed by considering the household as facing an investment decision, an investment in human capital. Education also has a consumption dimension, as it requires a reduction in consumption of other goods, to support the acquisition of books, school material, school uniforms and other education related materials, but also payment of tuition where and when education is not

free. The financial burden can, of course, be supported by external assistance, reducing the contemporaneous net spending on education. A thorough review of the seminal literature in demand for education can be found in Freeman (1987). Over the years, literature on demand for education has expanded, with a focus, mostly, on higher education[3]. Research has also expanded on education in developing countries focusing mostly on primary education[4].

Of all these countries, only Rwanda, Uganda and Malawi are classified as "fragile" by the United Kingdom's Department for International Development (DFID), Colombia is still a country facing an internal conflict and Northern Ireland is a post-conflict country. However, none of the studies concerned with these settings purposefully sought to analyse the demand for education in a framework that acknowledged the role of the experience of conflict. The linking of empirical and theoretical knowledge on education - and the drivers of educational demand and its application to the challenging arena of post-conflict settings - is thus clearly under-researched. There is a clear lack of acknowledgment of the particular nature that post-conflict settings present, a reality that

[3] Important examples are Wilkinson (1966), Heckman (1976), Lazear (1977), Mattila (1982), Willis and Rosen (1978), Fuller et al., (1982), Manski and Wise (1983), Altonji (1991), Manski (1993), Duchesne and Nonneman, (1998), Cameron and Heckman (2001), Canton and de Jong (2005), Saiti and Prokopiadou (2008), Brand and Xie (2010), Flannery and O'Donoghue, (2013), Delavande and Zafar (2014) and Prada and Urzúa (2014). A review of econometric studies on higher education can be found in Ehrenberg (2004).

[4] King (1993) on higher education in Puerto Rico; Kingdon and Theopold (2008) on India; Lloyd et al., (2009) on Pakistan; Nerman and Owens, (2010) on Tanzania; Oketch and Ngware (2010), Oketch et al. (2012) and Bold et al. (2014) on primary education in Kenya; Weir (2011) on Ethiopia; Chow and Shen (2006), Qian and Smyth (2011) and Deng et al. (2014) on China; Jensen (2010) on the Dominican Republic; Stephen (2012) on Nigeria, Glewwe and Kassouf, (2012) on Brazil; Albert and David (2012) on primary education in the Philippines; Biltagy (2012) on Egypt; Lincove (2012) on school enrolment in Uganda; Verdú et al. (2013) on higher education in Colombia; Benhassine et al. (2013) on Morocco; Bader (2014) on higher education in Jordan; and Attanasio and Kaufmann (2014) on higher education in Mexico. Examples of studies that also start looking into secondary education include Appleton et al. (1996) looking at the links between primary and post-primary education in Côte d'Ivoire and Uganda; Palmer (2005) on Ghana; Wedgwood (2005) on Tanzania; Hayman (2005) on the contribution of post-primary education to poverty reduction in Rwanda; Tilak (2007) examined India; Atchoaréna et al. (2008) considered Cabo Verde; Chimombo (2009) looked at private provision of education in Malawi; and Borooah and Knox (2014) investigated education performance in Northern Ireland. A recent empirical application in secondary education in developing countries can also be found in Ohba (2011) concerned with Kenya.

is affected by the conflict from which the country or region is transitioning from. This requires the contribution of an already existing body of knowledge which discusses the effects of conflict.

A review of the literature of impacts conflict can have on education suggests that it has a hindering effect[5]. FitzGerald, Stewart and Wang (2001) and Stewart and FitzGerald (2001) point out that school enrolments either decrease in conflict-afflicted countries or increase less in those settings than in others[6].

The literature on impacts of conflict on education has focused, mostly, on the effects it may have had while it was still taking place or in the immediate, short-run, emergency post-conflict stage. These works also mostly focus on impacts over outcomes, namely, the number of years of education attained. Only very few studies focused on school attendance (which is a more exact measure of demand) while most focus on enrolment, a measure that over-estimates demand by missing the events of school drop-outs during the school year. There is, therefore, much still to be understood about what drives demand for education in a post-conflict country, particularly when it starts transitioning out of the emergency stage.

Although a very significant proportion of out-of-school children live in conflict--afflicted countries, the understanding of the demand for education in post-conflict countries and the drivers behind this is still weakly understood. As the review above indicates, there are still important gaps in knowledge. While there is already some focus of research and policy on factors of supply of education in conflict-affected countries,

[5] Carlton-Ford and Boop (2010), Kondylis (2010) and de Groot and Göksel (2011) review some of these results.

[6] Equivalent results had been found by Skonhoft (2000) on Burundi; Blattman and Annan (2010) on Uganda; Shemyakina (2011) on Tajiskistan, Akresh and de Walque (2008), Agüero and Farhan Majid (2014) and Guariso and Verpoorten (2014) on Rwanda, Swee (2009) on Bosnia, and, finally in the immediate aftermath of the Timorese conflict, by Justino et al. (2013).

the same does not occur on the demand side. Likewise, while the body of research on demand for education in developing countries is significant, including studies on primary education, there is a lack of analysis of post-conflict settings. This is particularly the case of the analysis of demand for education and its drivers beyond the short-run stage of post-conflict emergency. By the same token, when looking at education in post-conflict countries at later stages of transition from conflict, in the medium-run, there is a lack of acknowledgment of possible legacies the conflict may have left.

The gap is even clearer with regards to the demand for secondary education, where, as Lewin (2005) highlights very little research as yet been conducted on developing countries. In this particular case, the analysis of demand for secondary education in Timor-Leste is one of the first contributions to an analysis of demand, at this level of education, in a post-conflict setting.

A gap is also perceived in the conflict literature, where there is a clear need of a merging with the literatures relating to demand for education and its structural drivers. Here, this research goes a step further, beyond the contribution of Shemyakina (2011), by allowing a contrast between the demand for primary and secondary education. It also deepens the analysis of the impacts of conflict within an empirical model of demand for education, as Shemyakina already had proposed in her study.

This thesis particularly addresses a gap of knowledge on the effects of conflict on one important driver of demand for education, namely, the returns to education. It offers and empirically tests a theoretical hypothesis on the processes through which conflict

impacts upon returns to education when previous literature only presumed these effects existed[7].

By setting the analysis in the country of Timor-Leste, this thesis seeks to add a small contribution to the understanding of post-conflict challenges, in one of the many sectors that face them. It is, nonetheless, an arena where policy planning and intervention clearly require a deeper understanding, as results take time to come to fruition and early weaknesses can turn into serious fragilities, which only become apparent in the future development of these countries and their people.

The context of this study: Timor-Leste

The context of this analysis is Timor-Leste, a relatively small country of 14,919 km^2. It is a young nation, having only been independent since 2002. With an estimated population of 1.2 million in 2012, Timor-Leste is also young in the sense that a significant proportion of its population is youthful, with 50% below 20 years old and 41% below 15 years old, according to its 2010 Census. Timor-Leste is also a founder of the g7+ group of countries, '*a voluntary association of conflict and post conflict countries that are now in transition to the next stage of development*', which has as its main objective to share '*experiences and learn from one another, and to advocate for reforms to the way development partners engage in conflict affected states*'(g7+ Secretariat, 2014).

This former Portuguese colony was invaded by Indonesia in December 1975, only a week after it had proclaimed unilaterally its independence from Portugal. For the following 25 years, Timor-Leste lived under a military occupation and the Timorese had to endure continuous violent oppression ranging at different scales of impact across the

[7] As per Rodriguez and Sanchez (2009),Shemyakina (2011) and Chamarbagwala and Morán (2011).

small country. At times, and in some districts, the levels of violence reached extreme heights, in relation to the number of killings and disappearances and also the amount of deaths by hunger and illness induced by military tactics of the occupier. The history of incidences of violence in each district during the conflict was driven, as documented by CAVR (2005) but also Taylor (1990, 1999), by the logistics of the fight between the Indonesian military and the Resistance, and was heterogeneous in its nature. The dynamics of the conflict also entailed the dispute of control over the territory, conditioned by the actions of the opposite forces. The experiences of violence and conflict, felt by each Timorese were themselves heterogeneous depending on the district of birth, year of birth and school life. These characteristics allow an econometric analysis of impacts of conflict on education to be adopted.

After many years of international pressure and being itself in a transitional process from a dictatorial regime to democracy, Indonesia eventually conceded that it would hold a referendum on autonomy for Timor-Leste. Under the international agreement that framed it, if autonomy were to be refused Indonesia would have to accept Timorese independence. The stated expectations of the occupiers were that the people would vote for autonomy. In August 1999, with a massive turnout (98.6%) and a significant majority of the voters (78.5%) the Timorese, however, clearly stated the opposite: they chose to be independent. What immediately followed was one of the most violent periods faced by the Timorese since the invasion had occurred. Finally, the military intervention of United Nations forces, led by Australia and with the support of friendly nations (United Kingdom, United States, Canada, France, Italy, Malaysia, Brazil, Argentina, Japan, New Zealand, Portugal) the violence was quelled. From 1999 to 2003, Timor-Leste was administered by a United Nations transitional authority in one of the first experiences of “nation-building” put in place (together with the experiences of

Bosnia, Kosovo or South Sudan). On the 20th of May 2002, Timor-Leste's Parliament approved its Constitution and restored its independence, now with international recognition.

This study looks at Timor-Leste a few years after the brutal end of Indonesian occupation of 1999. The country was, and it still is, in a post-conflict transitional stage. Free from the violence that had afflicted it for 25 years, but still with sequels that cannot be overlooked as the words of the Timorese Prime Minister clearly remind us:

> *"Post-conflict mentality is a collective reality that cannot be ignored when a nation has endured the severity of losses, faced the realities of past injustices, and experienced generations of conflict. This painful legacy is not often included when considering strategic planning."*
>
> (Office of the Prime Minister, 2010:6)

Timor-Leste is still mostly a rural country with a large proportion of its economy depending on agriculture. Timor-Leste also displays the dual nature of a country in (re)construction, with barely any industry of its own, where construction is still the most important industrial sector, behind agriculture, trade, social services or trade.

Table 1: Economic Structure - % of workers per sector

Economic Sector	1990	2010
Agriculture	83.6%	51.2%
Extractive Industries	0.1%	0.4%
Manufacturing and Utilities	2.6%	3.2%
Construction	1.0%	5.2%
Trade	2.9%	17.6%
Transports and Communications	0.4%	1.6%
Banks and Finacial Institutions	0.2%	0.0%
Social Services	9.1%	7.6%
Other	0.1%	13.2%

Source: World Bank (2013b)

The lack of weight of manufacturing is very significant. The heritage of colonization and occupation left a clear gap in the internal capacity for producing most of the goods the country consumes, other than food. The sequential food crises since independence[8]

[8] In its Comprehensive Food Security and Vulnerability Analysis report of Timor-Leste (WFP, 2006), only 36% of the Timorese population in 2005-06 was considered food secure.

highlight the fact that, even within the agricultural sector, a dependency continues to exist.

Against this backdrop, the Timorese Government put forward the Timorese 2011-2030 Development Strategy that proposes as strategic sectors those of Agriculture, Petroleum (upstream – Extractive Industries - and downstream – Manufacturing), and Tourism. It is clear that the challenge faced by Timor-Leste to build up its economy will require a qualified labour force and one matched to its strategic challenges.

Table 2: Qualification decomposition of employment per sector

Economic Sector	None or Pre-Primary	Primary or Pre-Secondary	Secondary, technical or vocational	Polytechnic or University
Agriculture	66.4%	25.8%	7.8%	0.0%
Extractive Industries	100.0%	0.0%	0.0%	0.0%
Manufacturing and Utilities	50.0%	37.5%	12.5%	0.0%
Construction	35.7%	42.9%	21.4%	0.0%
Trade	54.5%	29.5%	15.9%	0.0%
Transport and Communications	0.0%	33.3%	66.7%	0.0%
Banks and Financial Institutions	-	-	-	-
Social Services	0.0%	17.6%	58.8%	23.5%
Other	12.9%	38.7%	45.2%	3.2%

Source: DNE (2010)

The decomposition of current qualifications held per sector highlights, however, and not surprisingly, the very poor value added in those strategic sectors. In fact, higher-qualified workers are seemingly employed in social services (where one would expect to see public administration but also non-governmental organizations and international development agencies) or in the transport and communication sectors[9].

[9] It should be noted that these statistics lack information about the financial sector, where one would also expect a significantly high proportion of workers with tertiary education.

The need for qualified workers, already stressed by Hopkins, (2003) was also affirmed by the Timorese Government:

> *'Timor-Leste also needs an aggressive program to develop jobs skills. Currently there is considerable unemployment among high-school graduates. Soon, however, there will be intense skill shortages, as government programs and investments expand in health, education, petroleum, agriculture, and other sectors'*
>
> Office of the Prime Minister (2010:14)

However, in the school year 2004/05 the indication of school attendance in the country suggests a significant challenge also needs to be met there. The young Timorese population does not seem to find the same drive to be part of the proposed effort towards the attainment of higher qualifications.

Table 3: School attendance in 2004/05 per age (6 to 18 year olds) and gender (%)

Age	6	7	8	9	10	11	12	13	14	15	16	17	18
Female													
Prim.	6.6	25.8	49.7	72.4	81.4	80.3	81.8	73.4	59.4	47.2	32.6	15.8	15.4
Sec.	-	-	-	-	-	-	2.9	10.5	25.3	35.4	46.9	57.7	51.4
Male													
Prim.	8.0	24.0	49.4	71.6	76.8	83.3	81.4	78.6	68.6	51.3	44.6	24.2	20.9
Sec.	-	-	-	-	-	-	2.7	8.4	18.2	28.1	37.3	50.0	48.9
All													
Prim.	7.3	24.9	49.6	72.0	79.1	81.8	81.6	76.1	63.9	49.3	39.0	20.3	18.1
Sec.	-	-	-	-	-	-	2.8	9.4	21.8	31.7	41.7	53.6	50.2

Source: author's calculations using TLSLS (2007)

This has happened despite of a significant effort to increase the number of schools and teachers, from the period of UN Transitional Administration (Nicolai, 2004), to the current Timorese Ministry of Education's Strategic Programme (Ministry of Education, 2011).

It is likely that Timor needs an increase in the qualification of its population in order to meet the post-conflict challenges of reconstruction and development. However, this quest faces conflict legacies that may be affecting the incentives for the Timorese

themselves to take part in, and seek more education. This thesis seeks to contribute to a better understanding of these important dimensions.

Data used

This research uses the dataset of the Timor-Leste Survey of Living Standards of 2007 (TLSLS), conducted by the Timorese National Directorate of Statistics (DNE), with the support of the World Bank and UNICEF. A representative set of 4,470 households was interviewed, with 25,000 people surveyed, from all districts of Timor-Leste.[10]

A second dataset used is the Human Rights Violations Database (CAVR, 2006), containing 11,315 observations of human rights abuses. The observations are compiled from the collected narrative statements of the deponents to the Timorese Truth and Reconciliation Commission (CAVR), qualitative reports from Amnesty International and data collected by the Timorese NGO FOKUPERS. Under the CAVR mandate, Benetech-HRDAG produced and presented calculations of human rights violations in Timor-Leste in support of the commission's final report entitled "Chega!" (CAVR, 2005).[11]

The historical data documented in CAVR (2005) and also in Taylor (1999, 1990) allows for a comparison of the experience of different contexts of political control during the conflict, following the concepts of Kalyvas (2006). To make use of this possibility a novel dataset was constructed, as presented in the appendix to this thesis.

Finally, the empirical analysis was informed by qualitative data collected during fieldwork that took place in Timor-Leste from July 2012 to April 2013. During this

[10] The enumeration process (which started in March 2006) was suspended due to the 2006 crisis and all the households interviewed before suspension were re-interviewed after the process restarted, in 2007.
[11] Translation into English: "Enough!"

period a total of 24 life stories interviews were conducted in three sites: Bazartete in the district of Liquiça, in the West; Laclubar in the district of Manatuto, in the Centre; Lautem in the district of the same name, in the East. In those interviews, a population that had been of school age during the Indonesian occupation was targeted. The aim was to collect coherent narratives of the experience of living during that period, whether this concerned going to school or being denied that opportunity. The interviewees were also questioned about their aspirations regarding the education of their children if they were parents at the time of the interview. The qualitative data collected was used to allow for a triangulation of the econometric inference results, namely through representative citations of some of the interviewees, and it was also used to provide information on relevant household characteristics that needed be considered in the empirical models of demand for education[12]

Structure of the study

Chapter 1 looks into one of the most theoretically established drivers of education as an investment, namely, returns to education. It seeks to test the assumption that expected post-conflict returns to education are reduced as a consequence of the conflict, as presumed in the conflict literature. It also looks into the links between conflict and returns to education. The chapter addresses both these questions, by analysing the returns to education in Timor-Leste. Section 2 of the chapter reviews the process of Indonesian occupation highlighting the fact that it was not uniform and that the history of incidence of violence in each of the Timorese districts during the conflict was heterogeneous in its nature.

[12] Some of the variables that were introduced based on the qualitative interviews were the family status (as niece or nephew of the head of household), the status as adopted child, or the status as a migrant, as these were all indicated as relevant correlates of school attendance (or lack of it).

The analysis conducted and presented in this chapter explores the microeconomic theory supporting the estimations of returns to education and the theory and empirical studies of conflict. It asks the question: in what way might conflict-related shocks affect earnings and wage premiums after its resolution? A theoretical hypothesis is proposed in section 3 of the chapter: that conflict affects post-conflict earnings and returns to education through two channels. The first channel is the induction of lower economic activity and labour productivity, with a consequent reduction in earnings and returns to education. The second channel is the induction of reductions in the labour supply and in school attainment, with a consequent scarcity of qualified human resources that could cause an increase in earnings and returns to education.

Adhering to the socio-economic structure of the Timorese post-conflict labour market, the study presented in the chapter estimates returns to education using Ordinary Least Squares and Full Information Maximum Likelihood Heckman Selection Model regressions, clustered at the household level. It comprehensively explores different dimensions of the conflict that afflicted Timor, analysing different forms of violence (killings but also hunger and illness induced by military actions), and also the different nature of political control in different districts during the conflict. As seen in section 5 of the chapter, these indicators are tested both in the direct estimation of returns to education and in the selection model, allowing a richer scope of analysis. Endogeneity, selection bias and other sources of bias are addressed, together with robustness tests that reinforce the empirical results.

The evidence found in this study, presented in section 6, indicates that forms of violence experienced during the school life of individuals reduce the returns to education. It also indicates that the experience of extreme levels of violence and the disruption of livelihoods and access to education derived from these may create a scarcity of human

resources, making them more expensive. Evidence also points to an indication that the political conditions under which education occurred also affect the participation in the post-conflict labour market. Further studies in other post-conflict countries may confirm and validate whether the theoretical hypothesis presented holds in different settings.

The empirical model of the Timorese post-conflict labour market provides an added result arising from the impacts of conflict, namely, that that some effects may come not from the violence generated by conflict but from the actions put in place for reconstruction and peace-building. Evidence presented in section 6 indicates that the "aid economy" activated in support of post-conflict countries may generate distortions in the labour market.

The evidence generated in this study gives, therefore, a first answer to questions that have previously been left unanswered. It provides an estimate of returns to education in post-conflict settings, comparable with those found elsewhere. It also provides a first insight into the processes through which conflict, but also the post-conflict labour market setting, affects the returns to education. Furthermore, it discusses how returns to education may affect the incentives for households regarding their investment in human capital.

In support of the research conducted in this study, and with direct application to the empirical analysis presented in Chapter 1, a novel dataset on conflict indicators was constructed. This dataset seeks to allow the study to account for different levels of political control over the districts of Timor-Leste in each year of the conflict and the provision of services it may allow. This follows the typology discussed and proposed by Statys Kalyvas in his "Logic of Violence in a Civil War" (Kalyvas, 2006). Contrary to

early assertions, it is not always the case that violence is the main driver of behaviour change of economic agents and, particularly of interest in this study, regarding behaviour in relation to the uptake of education, participation in the labour market and returns to education. It may be the case that the access to, and quality of provision of, education in a particular area results from who controls an area and the depth of that control. It may be the case that it is the rebels that control the area and they make choices regarding the provision of public services, as discussed by Mampilly (2011). In this way these forces eventually establish a social contract with the residents, as discussed by Arjona (2010). Conversely, the incumbent might hold the control, seeking to establish the regular public services. Finally, it may also be the case that a territory is under dispute, which may weaken the control of whoever holds it but also damage the provision of services it can assure.

A chronology was constructed, following the events of violence as documented by Taylor (1999, 1990) and CAVR (2005) regarding the period of Indonesian Occupation of Timor-Leste. Following the classification of typologies of political control during the conflict, as constructed by Kalyvas (2006), the chronology is used in support of the generation of indicators of political control during the Indonesian occupation of Timor-Leste. These indicators of conflict were tested in the analyses undertaken in the chapters of the thesis. They are used in the first chapter as significant covariates in the regressions of the first stage selection model of the Heckman regression on returns to education.

In the appendix to this thesis, the dataset is presented, together with the process followed to undertake its construction.

Chapter 2 enquires whether it is possible to detect persistent impacts of conflict in decisions regarding primary education and in the medium-run. It looks at revealed demand for education, expressed in the decision to have a child attend primary school, in a country that overcame a conflict and five years after that conflict had ended. With this purpose, it looks at Timor-Leste and makes use of the nationwide living standards survey conducted in 2006-07 by the Timorese National Statistics Bureau and supported by the World Bank and UNICEF (TLSLS, 2007). In it, they enquired, among other topics, on the attendances at school. Within the representative set of 4,470 households interviewed, from all districts of Timor-Leste, 6,032 individuals, aged between 6 and 14 years old represent the subsample of interest in this chapter. A preliminary analysis of the descriptive statistics of this subsample gives an indication, although not statistically significant, that those children that experienced extreme levels of violence may be more likely to have attended primary school in 2004/05.

Building on the discussion on the drivers of demand, in section 2 of the chapter, the empirical enquiry applies a Probit regression, as used in studies such as Justino et al. (2013), Deng et al. (2014) or Attanasio and Kaufmann (2014). Two alternative proxies of the violence experienced during the Timorese conflict were used. The first proxy is: *Average Killings during the life of the child* (which expresses the continuum of violence the household witnessed in the district of birth of the child and during the conflict). The second proxy is: *Shock of extreme violence during the life of the child* (which is a binomial variable that indicates whether extreme levels of violence manifested themselves, at the district of birth of the child and during her lifetime). The empirical model was estimated using Probit and IV Probit regressions.

Accounting for a likely endogeneity of conflict, the study presented in this chapter tried to infer effects arising from conflict. While finding evidence that income and quality of

education are significant channels of influence of conflict on demand for primary education in this post-conflict setting, the study finds no robust evidence of effects of conflict beyond these.

The chapter is structured as follows. A brief description of Timor-Leste and its conflict will set the background in section 2. In section 3, the conceptual framework supporting the empirical analysis will be presented, followed by the empirical strategy in section 4. A brief description of the data and, finally, the results, will follow in sections 5 and 6, respectively. A discussion of the results will conclude the chapter, opening the debate for future reflections and ways forward from the research.

Chapter 3 contributes to an emerging literature on demand for secondary education and brings this into dialogue with the microeconomics of conflict literature. It stresses the need to research the drivers of education demand beyond primary school and in countries that have endured a conflict.

It looks at Timor-Leste in the school year 2004/05, five years after the conflict with Indonesia ended. In this study the impact of conflict focuses on the experience of extreme violence during the time of the conflict and when those that were adolescents in 2004/05 (aged between 12 and 18) were of school age.

Demand for secondary education will be analysed following an inter-temporal investment theoretical approach where attendance to school is a decision to be made by the household, but most decisively by the adolescent herself. As presented in section 2 of the chapter, this decision takes account of expected returns to education (as education is viewed as an investment), while also considering education as a consumed good (with

costs that act as constraints to the household's budget envelope) and valuing its quality. It finally postulates that, even five years after the end of the conflict, the household may still be affected by the previous experience of violence that conflict entailed, with effects on its choices regarding education, a hypothesis that is tested in this study.

The empirical model, following the conceptual discussion of section 2 will be first estimated through a Binomial Probit with Selection regression, also known as Heckman-Probit (HP). It will also be estimated through an IV Probit and a simple Probit regression. Endogeneity of the household's income is tested and corrected through an instrumental variables approach. Endogeneity of conflict is also discussed and accounted for through an Instrumental Variables (IV) approach. The empirical strategy is presented and discussed in section 3 of the chapter.

The data used for this analysis, presented in section 4 of the chapter, comes from the Timor-Leste Survey of Living Standards of 2007 (TLSLS, 2007), in which, from the households surveyed, 4,102 individuals are aged between 12 and 18 years old. It is complemented by data from the Human Rights Violations Database (CAVR, 2006).

The empirical results, in section 5 of the chapter, show that, almost in its entirety, the theoretically established relations of socio-economic variables with demand for secondary education can be observed. The variables - such as returns to education and quality of schooling - are, as the review in the chapter shows, negatively impacted by conflict. There is, hence, evidence that through these channels the experience of violence and conflict leads to lower demand for education. Yet the chapter shows that conflict also has an effect on the intrinsic preferences for education, with significantly important results. Most notably, there are indications that the experience of surviving violence and conflict may have had a positive effect on the revealed preference for

education. Evidence can be inferred that adolescents that experienced a shock of extreme violence during their school years were more likely to attend secondary school five years after the end of the conflict. This result is in agreement with the stated expectations of parents interviewed and is the object of reflection in the last section of the study.

The chapter is structured as follows. A brief description of Timor-Leste and its conflict will set the background in section 1. In section 2, the conceptual framework will be presented, followed by the empirical strategy in section 3. After a brief presentation of the data used, the empirical results will be presented, in sections 4 and 5, respectively. A synthesis and discussion of the results will conclude the paper, opening the debate for future reflections and ways forward for the research.

Summary of contributions and methodological caveats

In summary, this thesis proposes to contribute to knowledge of the economics of education in a post-conflict setting. It does this by proposing an economic analysis of such a setting as a hybrid socio-economic environment where conflict, despite having ended, still has an impact. It proposes and tests the mechanisms through which conflict may have impacted economic incentives to education, namely the returns to education observed post-conflict. In support of this analysis, it builds a dataset with a novel indicator of political control during conflict, following the framework developed by Kalyvas (2006). It seeks to establish evidence of medium-run impacts of conflict on the demand for primary education in a post-conflict setting, proposing and testing an empirical methodology in order to achieve this. Finally, it proposes and analyses an empirical model of the demand for secondary education in a post-conflict setting that integrates the hypothesis of medium-run impacts of conflict. In the process it finds

evidence that suggests a peace dividend exists in the form of higher preferences for secondary education among those that experienced more violence during the conflict.

The empirical analysis of demand for education proposed and put forward in this study had to confront relevant data limitations and empirical constraints derived from many incidences of endogeneity, which the questions being researched necessarily entail.

The data limitations encountered led to a less than ideal information on: school quality; lack of information on parents' educational attainment; absence of information on the individuals' cognitive skills due to lack of such type of assessments conducted regarding the period of analysis; lack of information on district of residence in each year of the individual's life - particularly of those that migrated; unreliable data on the year individuals entered school; and censoring of those that lived through the time of the conflict, in total or in part, but migrated out of Timor before the TLSL survey; and insufficient information on the household's income sources, among others.

Data limitations had an even greater effect on the dataset of conflict indicators. The CAVR (2006) contains a quantitative categorized collection of reported events such as reported human rights abuses, including causes of death, instead of official records. The lack of an organized police investigation in the early years of Timor-Leste as an independent country and the involvement of Indonesian and Resistance forces as perpetrators of violence precluded the possibility of a legitimate investigation being carried out by either side. Nevertheless, the Truth and Reconciliation process was indeed independent, significantly thorough and was validated at the community level throughout the country where formal and informal processes of reconciliation occurred CAVR (2005). The quantitative records may still suffer from errors of under-reporting of violence perpetrated by the Resistance and contain over-reporting of violence

perpetrated by Indonesian forces and, consequently, also of attribution of violence. The study tries to prevent errors of attribution by using indicators that are not sensitive to the side to which the violence is attributed. The attribution of violence to the individual as a victim also suffers from the fact that the indicators, although annual, are based on a district level. Attribution at the individual level required a set of assumptions as follows. First, all those that lived in each district at the time of the occurrence of reported violence, were considered on average, to have experienced the same level of violence. Second, it was considered that individuals lived in the same district, the district of birth, throughout the length of the conflict. Third, the age at which individuals started school was assumed to be 6 years, in order to generate indicators of the experience of conflict while at school age. Fourth, the threshold above which a year was to be considered "extremely violent" in each particular district was considered to be when the levels of violence reported for the district and the year exceed the average per year and district by two standard deviations[13]. These assumptions generate measurement errors, and robustness tests were conducted to account for these. While most of the results are shown to be robust, one important result - concerning the eventual medium-run impacts of conflict on primary education after accounting for endogeneity - could not be found robust.

A second set of caveats relates to the endogeneous nature that characterizes many of the economic relations studied. In each of the chapters likely sources of endogeneity are discussed. The analysis of returns to education in Chapter 1, faces two sources of endogeneity: endogeneity between education and earnings, in the established form of ability bias; endogeneity between earnings and conflict, which may come via omitted variables bias. In the empirical analysis supporting the study, the sources of endogeneity

[13] This procedure was previously adopted by Justino et al. (2013).

are discussed and there was an attempt to correct for them, as discussed there. However, again due to data limitations, the strategies adopted were not able to fully compensate for these. The resulting biases are discussed in the chapter. The analysis of demand for primary and secondary education post-conflict also faces endogeneity in structural covariates of demand. This requires the substitution of what would be endogenous indicators of use of time in work - inside and outside of the household - with proxy covariates that correlate with those decisions. Regarding the effect of household income on demand, again the endogeneity between income and the choice of education (which prevents the use of time in income generating activities) required a corrective approach. In this case, an Instrumental Variables approach was adopted, as discussed in the chapters. Finally, omitted variables bias may generate a possible endogeneity between the post-conflict choice of education and the previous experience of conflict. By applying the Instrumental Variables approach, evidence was found of such endogeneity and the empirical strategy adopted sought to correct this aspect. While the approach shows itself to be effective in producing robust estimates in the empirical analysis of secondary education, the same does not happen in the case of primary education. This situation is discussed in chapter 2 and possible pathways to overcome this are there suggested.

Bearing in mind these limitations, and accounting for them, this study seeks to position itself as a contribution to a more structured knowledge of the links between conflict and education. In particular, it seeks to move towards a better understanding of the education economy in a post-conflict country. Using Timor-Leste as the case studied, it suggests some unexpected but empirically robust post-conflict effects and opens the space for deepening an understanding of the legacies of conflict. It seeks therefore, to

assist in the better development of policies in the crucial process of transition from fragility to resilience.

Chapter 1:
Post-Conflict Returns to Education – the Case of Timor-Leste[14]

1- Introduction

What do we know about the economic incentives to invest in education in a post-conflict country? In the peace building and reconstruction stages of post-conflict, education is increasingly found to be an area of concern. UNESCO in its guidelines considers education to be a key strategy as it '*helps meet the psychosocial needs of children and adolescents affected by conflict*', '*provides a channel for conveying health and survival messages and for teaching new skills and values*' and '*is vital to reconstruction of the economic basis of family, local and national life and for sustainable development and peace building*' (Bensalah, 2002:11). But how much is known about what drives the demand for education in a post-conflict setting? In particular, what is it known about the economic incentives for an investment in education? What are the returns to education in a post-conflict setting?

As the nexus between peace and development - or between conflict and "*development in reverse*" as coined by Collier et al. (2003) - have become a topic of interest for research, various studies have devoted attention to the impacts of conflict on the economy. Studies such as those by Bellows and Miguel (2009), Badiuzzaman et al. (2011), Cerra and Saxena (2008) or Bisogno and Chong (2002) look into the impacts of conflict on the post-conflict economic rebound. Others, including FitzGerald et al. (2001), Blattman and Annan, (2010), Shemyakina (2011), Ibáñez and Moya (2006) or Justino et al.

[14] I would like to thank Patricia Justino, Edoardo Masset, Paola Salardi, Ricardo Sabates, Olga Shemyakina, Catherine Muller, Martin Greely, Alia Aghajanian, Xavier Cirrera, Elise Wach and Jenny Constantine for their comments, feedback and other support on this and earlier versions. I would also like to thank the comments of participants in the 8th Annual HiCN Workshop on Violent Conflict and Economic Development (Aix-en-Provence, France), the 12th UKFIET International Conference on Education and Development (Oxford, UK) and a seminar held at the National University of Timor-Leste (Dili, Timor-Leste).

(2013) analysed the impact of conflict on education, in most cases finding a detrimental effect on school enrolment and attainment. Rodriguez and Sanchez (2009) found similar results and their account suggested a cause for the reduced demand for education was that there was a reduction in the expected school premium caused by the conflict. Chamarbagwala and Morán (2011), looking at Mayan communities in Guatemala, suggested that, among other factors, decreased expectations concerning the returns from education due to conflict would justify a reduction of the households' investment in education. But are these expectations confirmed? What are the links between conflict and returns from education? The current body of knowledge still leaves these questions unanswered.

This article will address both these questions, by analysing the returns to education in a country that arose from 25 years of conflict, Timor-Leste. Formerly a Portuguese colony, from 1512 until 1975, Timor-Leste was then occupied by Indonesia and ruled by its military regime from 1975 to 1999. In 2007, the year surveyed, Timor was still in a process of reconstruction, and thus represents an example of a post-conflict country. As this chapter shows in section 2, the process of Indonesian occupation was not uniform and the history of incidence of violence in each of the Timorese districts during the conflict is a heterogeneous one. The different experience of violence felt by each Timorese allows us to look into post-conflict Timor and analyse empirically the impacts of conflict on returns to education.

The analysis is done by exploring the microeconomic theory supporting the estimations of returns to education, considering the theoretical and empirical studies of conflict and asking the question: in what way conflict-related shocks may affect earnings and wage premiums after the resolution of the dispute? A theoretical hypothesis is proposed in section 3: that conflict affects post-conflict earnings and returns to education through

two channels. The first channel is that conflict induces lower economic activity and labour productivity, with a consequent reduction in earnings and returns to education. The second channel is the induction of reductions in labour supply and in school attainment, with a consequent scarcity of qualified human resources that may cause an increase in post-conflict earnings and in returns to education.

Adhering to the socio-economic structure of the Timorese post-conflict labour market, this study estimates returns to education using Ordinary Least Squares and Full Information Maximum Likelihood Heckman Selection Model regressions, clustered at the household level. It comprehensively explores different dimensions of the conflict that afflicted Timor, analysing different forms of violence (this includes killings but also the hunger and illness induced by military actions), while also the different nature of political control in different districts during the conflict. As seen in section 5, these indicators are tested both in the direct estimation of returns to education and in the selection model, allowing a richer scope of analysis. Endogeneity, selection bias and other sources of bias are addressed, together with robustness tests that reinforce the empirical results.

The evidence found in this study, presented in section 6, indicates that forms of violence experienced during the school life of individuals reduce the returns to education. It also indicates that the experience of extreme levels of violence, and the disruption of livelihoods and access to education arising from this cause, may create a scarcity of human resources, making them more expensive. Evidence also points to indications that the political conditions under which education took place also affect the participation in the post-conflict labour market. Further studies in other post-conflict countries may confirm and validate whether the theoretical hypothesis presented here holds in different settings.

The empirical model of the Timorese post-conflict labour market gives added insights into the impacts of conflict, some of which may not come directly from the violence it generated but from the actions put in place for reconstruction and peace-building. Evidence presented in section 6 indicates that the "aid economy" activated in support of post-conflict countries may generate distortions in the labour market.

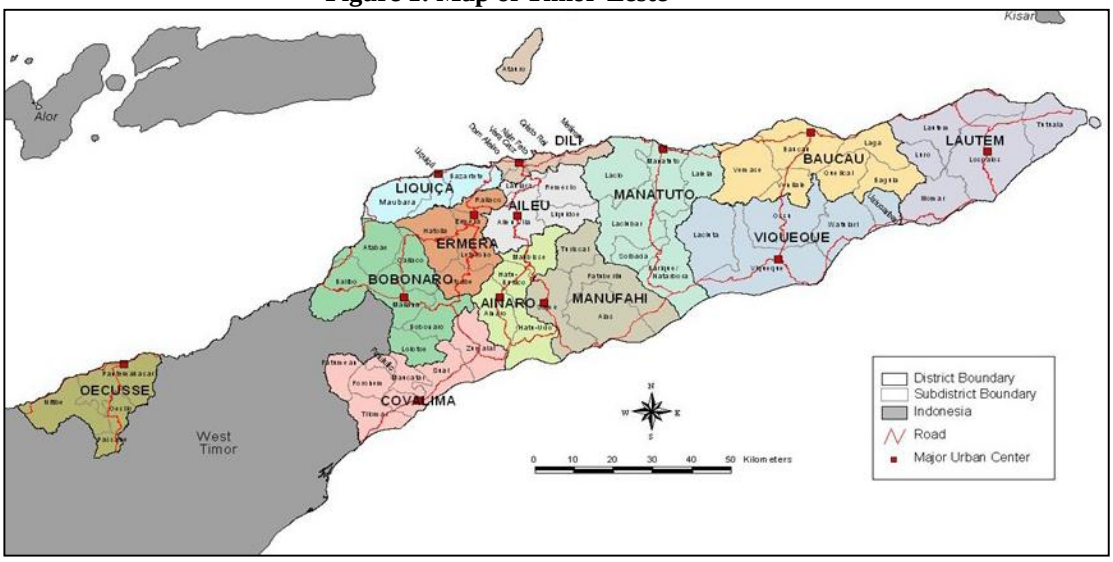
The evidence generated in this study gives, therefore, a first answer to questions that have previously been unanswered. It provides an estimate of returns to education in a post-conflict situation, comparable with those found in other settings. It also provides a first insight into the ways in which processes through which the actual conflict - but also the post-conflict labour market - affect the returns to education. Through them, it also throws light on the incentives for households regarding their planned investment in human capital.

2- Background

The setting of this analysis of returns to education in post-conflict is Timor-Leste during 2007. Timor-Leste is a young nation, which has been independent since 2002. With a relatively small territory, 14,919 km2 wide, Timor-Leste is a half-island. It neighbours Indonesia by sea in the North and East and by sea and land in the West (including the western half of the island); while Australia lies, by sea, to the South. With an estimated population of 1.2 million in 2012, Timor-Leste (hence forth designated as Timor) has seen its economy's Gross National Income (GNI) per capita[15] grow from 650 USD in 2002 to 3,620 USD in 2012 (World Bank, 2013b).

[15] The values of the Timorese GNI per capita reported here were calculated using the Atlas method.

Figure 1: Map of Timor-Leste



Source: DNE (2008)

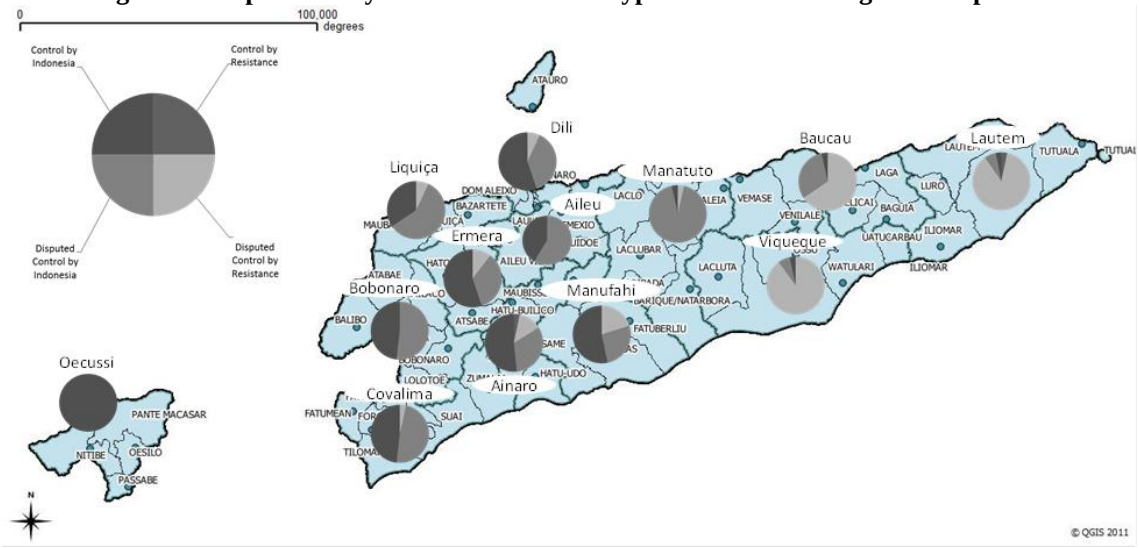
Timor is starting to explore its significant oil and natural gas reserves but its economy has not evolved much since independence. Timor is mostly a rural country, with almost three quarters of the population living in rural areas and working in agricultural activities. It is also a very young country, with half of its population below 20 years old and 41 per cent below 15 years old, according to its 2010 Census.

Another important characteristic of Timor, and one that is critical for our analysis here, is that it is a post-conflict country. Formerly a Portuguese colony, from 1512 until 1975, Timor-Leste was occupied by Indonesia and ruled by its military regime from 1975 to 1999. The process of occupation was not uniform. During the first 5 years, the Timorese Resistance secured control of wide parts of the easternmost districts. This was a period of extreme violence. Even during the years that followed, these and the southernmost districts were disputed territories, even if mostly already under Indonesian control. Other districts experienced a longer period of control by Indonesia.

Figure 2, below, summarizes the length of control by the Indonesian forces and the Timorese Resistance. For each district, the figure presents a circle indicating the proportion of the 25 years of occupation lived under 1 of 5 types of control proposed by

Kalyvas (2006). Kalyvas proposes a classification of territories according to levels of control: full control by the incumbent forces; dominant but disputed control by the incumbent forces; contested control; dominant but disputed control by rebel forces; full control by the rebel forces.

Figure 2: Proportion of years under different types of control during the occupation



Source: Map of Timor-Leste (GERTIL, 2003); graphs were calculated by the author following Kalyvas (2006), CAVR (2006) and Taylor (1999, 1990).

Each typology of control correlates with typologies of violence and with which side is expected to be enacting the given type of violence. In this analysis, Indonesia is considered the incumbent and the Timorese Resistance the rebels. Using the chronology of events offered by Taylor (1999, 1990), it is possible to construct a schedule of control over each district and year. In the Appendix A of this thesis a description and discussion of the process of attribution is presented. Figure 2 illustrates this attribution.

The Timorese Truth and Reconciliation report (CAVR, 2005) offers a thorough description of the violence endured by Timorese during the occupation. Three stages of the conflict are described: invasion and consolidation (from 1975 to 1985), stable military control (from 1985 to 1997) and the ending stage of occupation (1998 and

1999), including the referendum in 1999, its preparation phase, and the violent post-referendum period. In Figure 3, below, it is possible to perceive five peaks in the levels of killings, coinciding with the periods described. The first peak corresponds to the moment of invasion in 1975, followed by two other peaks, corresponding to the main Indonesian military campaigns to acquire and consolidate control over territory, which was still under the control of the Timorese Resistance (the first in 1978-79 and the second in 1983). These three peaks indicate extreme moments of an overall violent period, as the median line suggests. Figure 4 reveals another dimension of the violence endured by Timorese in the first stage of occupation. The number of deaths due to hunger and illness were also direct consequences of the Indonesian military operations, whose tactics entailed forced displacement into new "villages",[16] burning of crops and forests and siege tactics on villages thought to support the Resistance (CAVR, 2005). This was followed by a period of five years of famine in some districts that reportedly killed more people than the military violence. The second stage of the occupation was significantly less violent. The only spike in violence was reported in the district of Dili in 1991, namely, the massacre in Santa Cruz Cemetery, which is signalled by the fourth peak in Figure 3.

The third stage of occupation showed, again, an increase in violence and ended with a final bout of extreme violence. Following an impressive 78.5% vote for independence in the August 30th 1999 referendum, the Indonesian military (mandated by the UN to maintain security during the procedures) and the pro-Indonesia militia destroyed most of the infrastructure in the country and forced the displacement of nearly a third of the Timorese population, most of whom were later to return to an independent country under reconstruction (CAVR, 2005).

[16] Many places in Timor are named "kampung baru" (meaning "new village" in Indonesian)

In-depth life story interviews conducted in Timor during the period from July 2012 to April 2013 revealed consistent testimonies of total destruction of schools and forced displacement both in the periods of invasion and the post-1999 referendum. After both those stages, educational infrastructure had to be reconstructed. Those that lived in areas targeted by the 1978-1979 and 1983 military campaigns experienced repeated events such as destruction of infrastructure; forced displacement; loss of relatives; hunger and illness (CAVR, 2006, 2005), all of which compromised the opportunities for schooling.

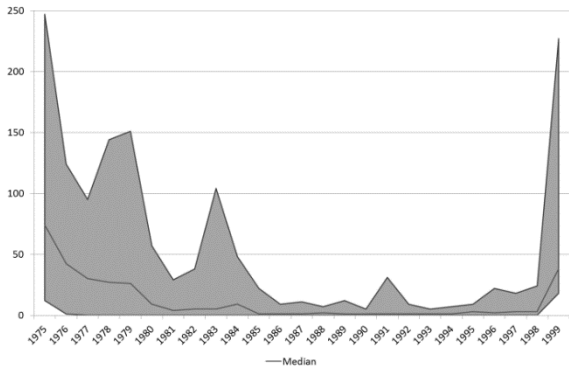


Figure 3: Civilian killed in each district (maximum, median, minimum) in each year

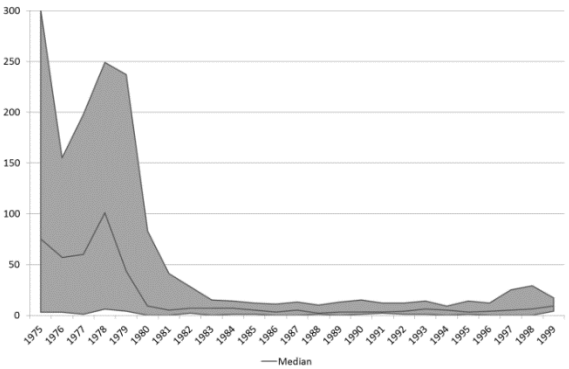


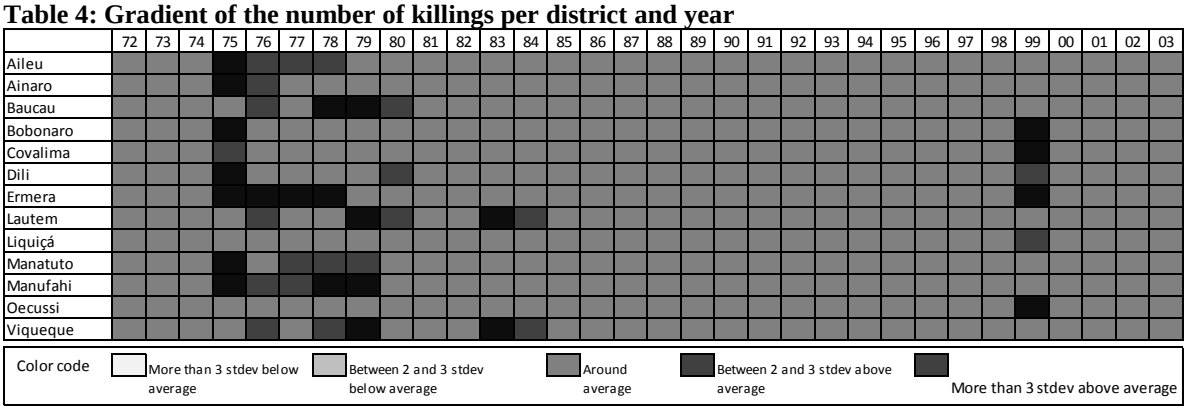
Figure 4: Deaths due to hunger and illness in each district (maximum, median, minimum) in each year

Source: Author's calculations using CAVR (2006) data.

Figure 3 and Figure 4 already give an indication that the violence that afflicted Timor during the Indonesian occupation did not affect all districts homogeneously. This was particularly evident in years of higher violence where the bandwidth between minimum and maximum violence is wider. It is also noticeable that only at the beginning and end of the occupation can we find all districts affected by violence.

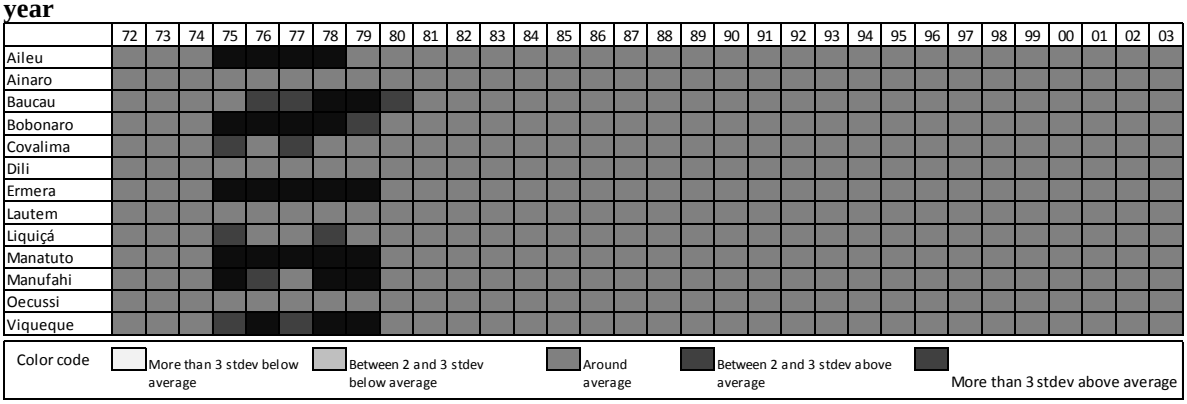
Table 4 and Table 5, below, make this heterogeneity among districts more apparent. They present gradients of violence, illustrating for each district and year the corresponding z-score relating to the number of killings and disappearances (Table 4) and the number of deaths by hunger and illness (Table 5).

Table 4: Gradient of the number of killings per district and year



Source: Author's calculations using CAVR (2006) data

Table 5: Gradient of the number of the number of deaths due to hunger and illness per district and year



Source: Author's calculations using CAVR (2006) data

The tables show that those households residing in the districts of Dili or Ainaro were relatively safe from violence, when compared to those residing in Aileu, Baucau, Ermera, Manufahi or Manatuto. It is also noticeable that those born after 1980, particularly those residing in districts relatively protected from the 1999 violence, may have experienced much lesser levels of violence than those born, or of school age, during the invasion.

The history of incidence of violence in each district during the conflict, was driven - as documented by CAVR (2005) but also Taylor (1990, 1999) - by the logistics of the fight between the Indonesian military and the Resistance and presents an heterogeneous picture. The different experience of violence - felt by each Timorese depending on the district of birth, year of birth and school life - allows us to look into post-conflict Timor and analyse empirically the impacts of conflict on returns to education.

Once estimated, the returns to education in post-conflict Timor-Leste can be compared with values found in other developing countries. A brief review points to a range of values of returns to education between 3 per cent, notably for Eastern European countries,[17] and up to 15 per cent in Thailand[18] and in Brazil[19]. Focusing on Southeast Asian countries reviewed by Patrinos et al. (2008), Cambodia, Indonesia, Philippines, Singapore, Thailand and Vietnam, we can find returns to education that tend to lie in the 3-12 per cent range. Notably returns to education in neighbouring Indonesia, for male wage earners aged 25-65 year old, were estimated to be 11.4 per cent, as suggested by Patrinos et al. (2008). Once estimated, it will be possible to compare the returns to education in post-conflict Timor-Leste against these benchmarks.

The next section presents and explores the theoretical concept that will support our empirical analysis. It will be followed by the presentation of the empirical strategy and finally the discussion of the empirical evidence obtained.

3- Conceptual Framework

The seminal work on returns to education by Becker (1962) and Mincer (1974, 1958) established education as an investment in "human capital".[20] They sought to measure the returns from such an investment, defined as an education premium that more than compensates for the direct costs incurred in education and the opportunity costs resulting from a later entry into the labour market. This premium takes the form of higher wages accrued as a result of expected higher productivity among those with higher qualifications. Becker's model makes it clear that those wages are primarily driven by firms' perception of how much education contributes to higher productivity[21].

[17] As per Flabbi et al. (2008).
[18] As per Warunsiri and McNown (2010)
[19] As per Patrinos et al. (2008)
[20] The concept of education as investment in human capital was introduced by Schultz (1961).
[21] The same insight can be found in Willis (1986).

A different perspective, drawn by Spence (1973) provides insight into additional links between education and wages. In his model, education does not increase an individual's human capital. Instead, it signals to labour demand agents (firms and other employers) that an individual with higher schooling is intrinsically a more able worker and, therefore, more productive. Given a supply of differently educated workers, firms' perceptions of this signal are the main driver of wages and education premiums.

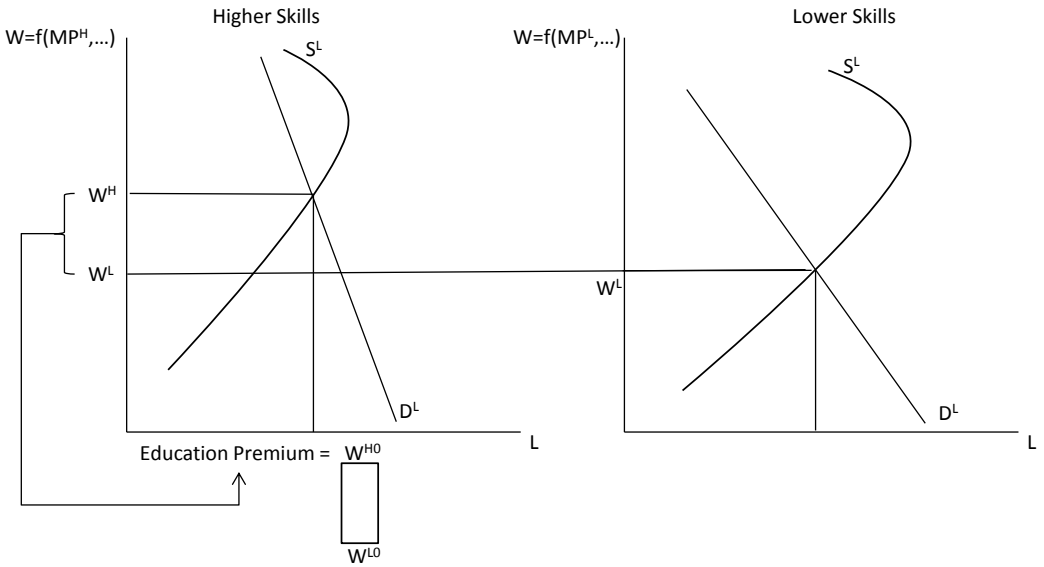
Many empirical studies on returns to education seek to isolate the contribution of education to added productivity from the notion of intrinsic ability. The aim in those approaches is to estimate the net contribution of education to increased labour productivity using wage premiums as visible indicators of returns to education. These are relevant concerns when analysing the contribution of education to economic growth. This chapter, however, places the focus on the microeconomics of labour and education. It seeks to estimate if, in a post-conflict setting, a household, deciding on whether to invest in education, will encounter the economic incentives that will make them pursue such investment. For such a household, it is the compounded effects of added education on the consequent wage premium (increased productivity and signal of ability) that are of concern.

The empirical estimates of returns to education are calculated from observations of several individual results derived from a matching process between the demand for labour, represented by different employers, from different sectors and industries and a labour supply represented by differently educated workers. This matching process happened in the post-conflict labour market. The economic actors in both the supply and demand side are expected to have bestowed different values on the skills being offered (and signalled) by workers, dependent on their level of education. The returns to education observed in a post-conflict labour market are, therefore, affected by shocks

that impact upon labour demand, labour supply and the quality of labour supply. Conflict theory and empirical analysis can contribute to a better knowledge of these shocks and their impact at different stages in a conflict. This study builds on that body of research to construct the first estimation of the impacts of violence on the post-conflict returns to education. This section will provide the theoretical approach to be tested empirically in section 6, below.

The impact of conflict-related violence can be constructed as the difference between the existing returns to education and those that might have prevailed if conflict had not occurred, or, if particular forms of it had not become manifest. Taking a simple generic example, one can consider that, were everything else to be held constant, and following the rationale provided by Becker (1993, 1962), a household when contemplating whether to invest in the education of one of its members, envisions the opportunity of allowing her to be hired in one of two types of employment. The labour market is, in this example, segmented in two, as depicted in Figure 5, below.

Figure 5: Model with two labour markets - education premium

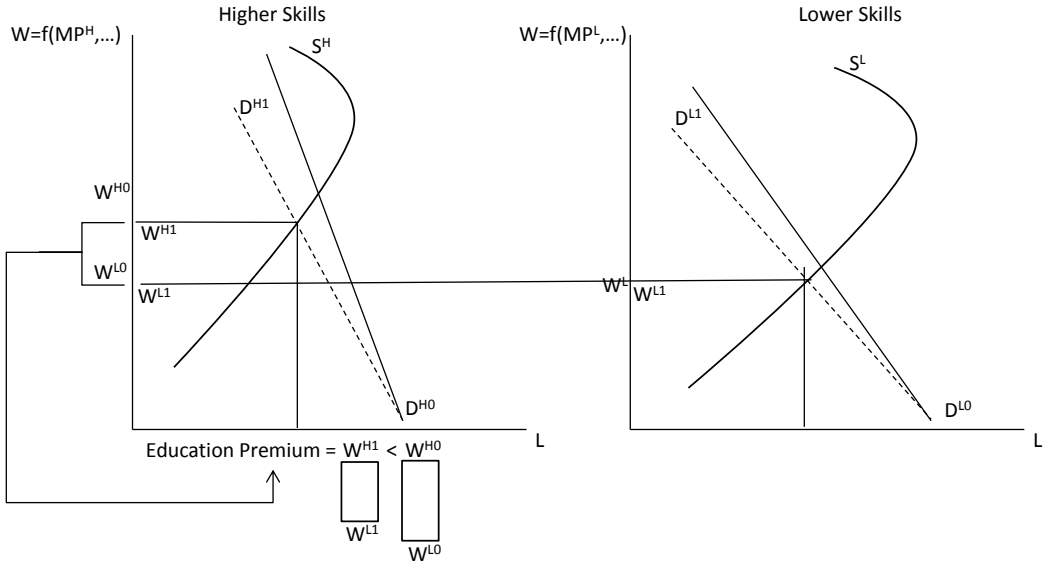


In the first segment, labour incorporates lower skills, therefore awarding lesser marginal productivity to the employers, which therefore remunerates her with a lower wage. In the second segment, labour incorporates higher skills, achieved (or signalled) through education. Expecting higher productivity, the employers are willing to pay a higher wage. Given the cost of education, one could also expect a lesser number of individuals would make the choice of entering this market, thus further increasing the equilibrium wage. In this illustration, a wage premium, $W^H - W^L$, gives the value to be gained by the household from investing in its member's education.

The emergence of conflict during the years of schooling leads to a set of effects on the labour market and on education. A first effect is a reduction of the economic activity during the conflict and after it subsides. Bellows and Miguel (2009) note that this is the most commonly expected effect of a conflict. Although, as found by Badiuzzaman et al. (2011) post-conflict reconstruction programmes tend to mitigate this effect, Cerra and Saxena (2008) establish that what we find is but a partial rebound, a recovery of half the loss in four years while the remainder takes more than a decade to be recovered. Studies such as those undertaken by Bisogno and Chong (2002) found that the effects of recovery and rebound can be differentiated across a country, with zones and economic sectors targeted by reconstruction projects benefiting more than others. Another effect is a reduction in productivity, as determined by studies such as Kondylis (2010). This may happen due to factors such as forced inactivity, as suggested by Collier and Duponche (2010), inadaptability of own skills, particularly of those displaced, following Ibáñez and Moya (2009) or due to the deterioration of the quality of education under conflict conditions, as put forward by Cranna (1994).

The impacts of this set of effects on the education premium are depicted in Figure 6, below. The reduction in productivity affects both low skilled and high skilled labour markets. If we assume that the acquisition and reproduction of knowledge and skills is progressive, any destruction of skills in the form referred to above is likely to have effects proportional to the levels of skills required. If that is the case, labour demand and the level of productivity in the higher skills labour market will reduce more than that in the lower skills labour market. Conflict will lead to lower labour demands that will lead, in turn, to expected decreases in the returns to education.

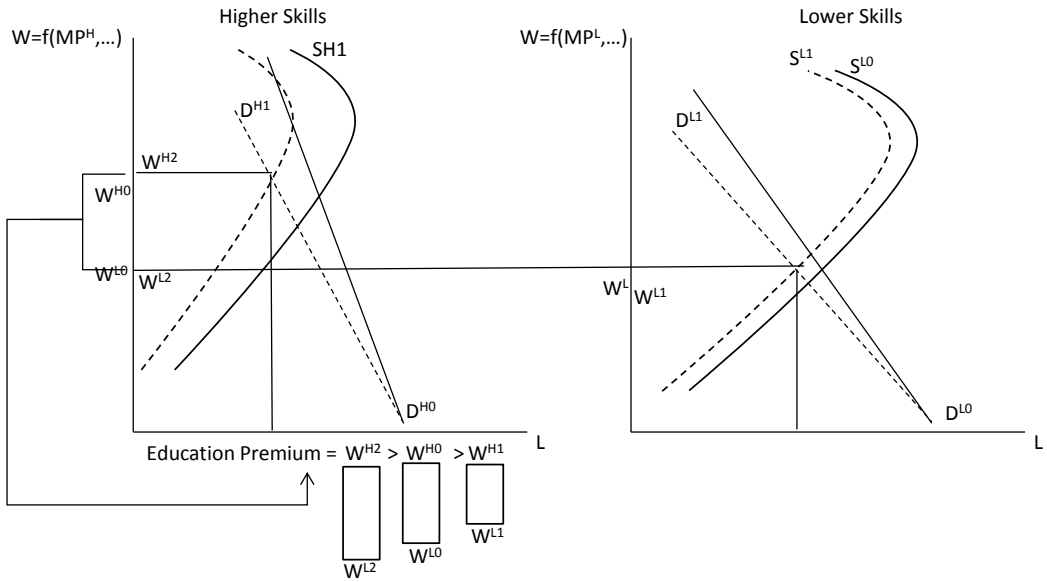
Figure 6: Model with two labour markets – reduction of productivity and economic performance



However, a second set of effects act in the opposite direction, as illustrated in Figure 7, below. Conflict destroys production and productivity but it also leads to a reduction in labour supply, due to conflict fatalities. Bircan et al. (2010) found that in conflict-afflicted countries, labour force participation stays below the long-term average during the first 10 years after the conflict. This reduction is arguably higher in what would have been a more highly skilled labour, due to a reduction in school attainment, as documented in studies such as FitzGerald et al. (2001), Stewart et al. (2001), Blattman and Annan, (2010), Shemyakina (2011) and, particularly in relation to Timor-Leste, in

Justino et al. (2013). By the same token, a correlated increase in school drop-outs and lower quality of education are documented by Evans and Miguel (2007), Ibáñez and Moya (2006) and Rodriguez and Sanchez (2009).

Figure 7: Model with two labour markets – reduction of labour supply



All other effects being constant, the reduction of labour supply may even induce a situation of relative scarcity. Conflict would then induce an increase in wages, irrespective of education. Compounded with lower school attainment, this reduction is more likely to be felt in the supply of high skilled labour. If that is the case, conflict would induce an increase in returns to education, as illustrated in Figure 7.

This brief review establishes, therefore, a theoretical hypothesis of two channels through which conflict may affect post-conflict earnings and returns to education: first, effects arising from a decrease in productivity and, second, the effects due to the scarcity of qualified human resources. The empirical analysis below will test this hypothesis in the setting of post-conflict Timor-Leste.

4- Data Description

This research used the dataset of the Timor-Leste Survey of Living Standards of 2007 (TLSLS), conducted by the Timorese National Directorate of Statistics (DNE), with the support of the World Bank and UNICEF. A representative set of 4,470 households was interviewed, with 25,000 people surveyed, from all districts of Timor-Leste.[22] From these, 15,809 were above 15 years old, of working age according to Timorese law. Only those in a subsample of 9,010 have an occupation, of which only an even smaller subsample of 1,221 people have a job that earns them a wage.

A second dataset used was the Human Rights Violations Database (CAVR, 2006) which contains 11,315 observations of human rights abuses. The observations referred to are the collected narrative statements from deponents to the Timorese Truth and Reconciliation Commission (CAVR), qualitative reports from Amnesty International, and data collected by the Timorese NGO FOKUPERS. Under the CAVR mandate, Benetech-HRDAG produced and presented calculations of human rights violations in Timor-Leste in support of the commission's final report entitled "Chega!" (CAVR, 2005).[23]

In Table 6 we can find some distinctive characteristics of the subsample of paid workers. The average hourly wage among paid workers was 1.16 US dollars, significantly above the poverty line of two US dollars a day. The proportion of women among paid workers is very clearly lower than in the representative TLSLS sample, suggesting evidence of gender segregation in the labour market. The rural/urban divide is also clear. Close to 80 per cent of the paid workers were urban dwellers, a much higher proportion than in the representative sample. The average age of the paid

[22] The enumeration process (which started in March 2006) was suspended due to the 2006 crisis and all the households interviewed before suspension were re-interviewed after the process restarted, in 2007.
[23] Translation into English: "Enough!"

workers was 37 years old in 2007. This would mean that the average paid worker would have been close to school entry age at the time of the Indonesian invasion, in 1975.

Table 6: Earnings and Education

	Paid Workers		All	
N	1,221		25,000	
Variable	Mean	SDev.	Mean	SDev.
Has a paid job	100%	-	14%	-
Hourly wage (USD)	1.16	4.11	-	-
Woman	20%	-	49%	-
Age	37	10	23	19
Household size	7	3	7	3
Resides in an urban area	79%	-	47%	-
Migrated	27%	-	8%	-
Education				
Years of Education	11	5	4	5
Completed Primary School	10%	-	13%	-
Completed Pre-Secondary School	10%	-	8%	-
Completed Secondary School	52%	-	9%	-
Completed Vocational School	1%	-	0.03%	-
Completed Graduate Education	0.1%	-	0.1%	-
Completed Postgraduate Education	4%	-	1%	-
Experience (years)	20	12	-	-

Source: Author's calculations, from TLSLS (2007).

The representative sample of the TLSLS suggests a population that does not migrate, with 92 per cent still living in the birth district. The paid worker subsample has a higher proportion of internal migrants, at 27 per cent, but this is still relatively low.[24] Notably, there are no differences in the household size between the paid workers subsample and the TLSLS sample. A look at education levels reveals striking differences. Average years of schooling among the paid workers in the subsample were almost three times higher than the sample average. One can also notice that half of the paid workers completed secondary school. This correlates with evidence collected during qualitative research: most of those employed in qualified public service positions (teachers, nurses, policemen,…) completed their education in secondary level technical schools.

The analysis of the subsample of paid workers in the TLSLS suggests an interesting disaggregation: close to 60 per cent work in public services (social services), close to 30

[24] Unfortunately, it isn't possible to track whether the individuals migrated or displaced themselves during the conflict, only whether they currently resided in a district different from that of their birth.

per cent work in private services, 7.2 per cent are in industrial activities and only 3.5 per cent are active in the primary sector, indicating that most of the employment in agriculture is not paid.

Table 7: Type of Employer

	Percent	Years of Education		Hour Wage (USD)	
		Mean	SDev	Mean	SDev
Private company, enterprise or cooperative	9%	8.6	5.5	1.3	3.2
Rural public works program	11%	11.2	4.8	0.6	0.4
Government, public sector, army	45%	11.5	4.3	1.5	5.4
State-owned enterprise	4%	11.4	4.6	0.5	0.4
Private individual	13%	6.9	4.5	0.9	4.0
NGO	15%	11.4	5.1	0.9	1.9
Other	3%	9.8	6.3	0.8	1.2

Source: Author's calculations, from TLSLS (2007).

The distribution of paid employment per type of employer, in Table 7 is also telling: the government was the major employer, either directly (hence 45 per cent were engaged in government, public sector and army, added to the 11 per cent employed in rural public works programmes, which were mostly funded through international aid programmes) or indirectly in state-owned enterprises (4 per cent). NGOs were the next most important type of employer (at 15 per cent) followed by self-employment (13 per cent) and, finally there were private companies, enterprises and cooperatives (9 per cent). This reveals familiar traits of a post-conflict setting: a very shallow formal economy, which is highly dependent on public services and the "aid economy" as its main employers. Notably, it is not the private sector that hires, on average, the most qualified workers, but the government and the "aid economy". The higher average wage is paid by employment in the public sector, although with a significant dispersion (high standard deviation), followed, at some distance, by the private sector and NGOs.

Table 8, below, is also telling. The district of Dili, capital of Timor-Leste, has a high concentration of the formal labour force, close to one third of paid employment, which is a much higher proportion than would be expected in terms of its importance in relation to the number of residents living there. This correlates with a higher proportion of those that have Tétum as the mother language. Notably, the most important ethnolinguistic group, Mambae, has a much weaker representation in the paid workers subsample. Tétum is the Timorese lingua franca and the only national language that has, alongside Portuguese, an official status.

The knowledge of Tétum appears high among all paid workers. It is followed by the knowledge of Indonesian and then by Portuguese, which is only spoken by close to half of the paid workers. However, the difference between the proportion of paid workers in the TLSLS sample that know Portuguese and the proportion of those that do so in the full sample is strikingly high, suggesting that lack of knowledge of this language may be a barrier for employment. To a lesser degree, the same can be said of English and Indonesian. These have "working language" status according to the Timorese constitution and are required for some types of employment.[25]

[25] Notably English stands as a language required for employment with many NGOs.

Table 8: Geography, Ethnicity and Language

Variable	Paid Workers	All	Variable	Paid Workers	All
			Residence		
Region 1	16%	20%	District of Dili	33%	15%
Region 2	16%	19%	Region 4	14%	20%
Region 3 except Dili	4%	11%	Region 5	17%	15%
			Ethnolinguistic Group		
Mambae	14%	23%	Galolen	2%	2%
Tetum	32%	18%	Uaimua	1%	2%
Baiqueno	16%	14%	Naueti	1%	1%
Macasae	7%	8%	Midiki	1%	1%
Bunak	6%	7%	Macalero	1%	1%
Kemak	3%	6%	Laklei	0%	0%
Tetum terik	4%	6%	Sa ani	0%	0%
Tokodete	3%	5%	Mangilih	0%	0%
Fataluku	5%	5%	Kaklun bikeli	0%	0%
			Other Language	3%	3%
			Language Barriers		
Speaks Tétum	100%	87%	Speaks Portuguese	54%	16%
Speaks Indonesian	94%	40%	Speaks English	27%	5%

Source: Author's calculations from TLSLS (2007). Note: Region 1 = districts of Lautem, Baucau and Viqueque; Region 2 = Manatuto, Manufahi and Ainaro; Region 3, excluding Dili = Aileu and Ermera; Region 4 = Liquiça, Covalima and Bobonaro; Region 5 = Oecussi.

The experience of conflict is also diverse, as is apparent when comparing the subsample of paid workers with the TLSLS representative sample, as per Table 9 below. As the indication of the average age of paid workers in Table 6 suggested, it is more likely that people who experienced the Indonesian invasion will be found in this subsample. This correlates with the evidence that, on average, those with paid employment witnessed higher levels of violence, namely civilians who were killed or disappeared and deaths due to hunger or illness in their birth district. Also on average, the data shows that a Timorese experienced in her life one year of extreme violence, i.e., a year where the number of killings and disappearances or deaths by hunger or illness in her birth district exceeded the yearly average by two standard deviations.[26] However, the experience of violence is more heterogeneous if the analysis is narrowed to the years of schooling.

[26]This definition follows Justino et al. (2013).

Table 9: Experience of Conflict at the birth district

	During Life Time				During School Life			
	Paid Workers		All		Paid Workers		All	
Variable	Mean	SDev.	Mean	SDev.	Mean	SDev.	Mean	SDev.
Yearly average number of civilian killed or disappeared	10	5	7	6	12	14	8	14
Yearly average number of deaths due to hunger or illness	11	8	7	7	16	22	9	18
Years under extreme killings	1	1	1	1	0.5	1	0.1	0.4
Years under extreme hunger and illness	1	2	1	1	1	1	0	1
Years in a disputed territory	13	8	7	8	5	5	1	3
Years in a territory controlled by Resistance	5	7	3	6	2	4	1	2

Source: Author's calculations, from TLSLS (2007).

While an analysis of conflict experienced during a lifetime is relevant, it mitigates the evidence of violence experienced during the key period for our analysis: the school life of individuals. As discussed above, conflict not only impacts upon the economic activity in its aftermath but hinders school attainment and school quality during it. It would therefore be advisable in an investigation to test the impacts of conflict using indicators of violence experienced during school years.

The historical data, presented in section 2, also allows for a comparison of the experience of different contexts of political control during the conflict, following the concepts of Kalyvas (2006). As explained in section 1, a schedule of control was constructed and this is used here to produce indicators of political control, namely the number of years lived under each type of control. As with other indicators, it is noticeable that paid workers lived a higher proportion of their lives in disputed territories and under the control of the Timorese resistance. The difference is even more noticeable when looking at the number of school years.

It is now clear that the violence endured by the Timorese during the 25 years of Indonesian occupation was not homogeneously experienced by all. The level of violence and the characteristics of political control in a given territory that were experienced by any one Timorese during her lifetime - and even more so during her school life - can be significantly different from that experienced by another person

depending on the district and year of her birth. These heterogeneous dimensions make it possible to empirically assess how conflict affected returns to education in post-conflict Timor-Leste. The investigation into these dimensions and issues will be undertaken following the methodology discussed in the next section.

5- Empirical Strategy

Let us, therefore, consider that for every individual $i = 1, \dots, p$ of the subsample of n individuals with a formal, wage earning, occupation, y_i represents her average hourly wage.[27] Building on Becker (1962) and Mincer (1974), the empirical model starts from an earnings equation with the following stochastic form:

$$\ln y_i = a_0 + r * S' + \beta_1 * t_i + \beta_2 * {t_i}^2 + \gamma * X_i' + \theta * {W_i}' + u_i, \quad (1)$$

where $E(u_i) = 0$, t_i corresponds to her work experience, starting immediately after completion of schooling,[28] X_i is a vector of individual, household, industry and region-specific control variables and W_i is a vector of individually specific conflict related variables. The empirical strategy explores a vector of schooling indicators, S_i, which include the years of education, s_i, as per Becker (1962) and incorporates education specific signals perceived by the labour market, building on the contribution initiated by Spence (1973). These are control variables indicating the last complete level of education, testing for the "diploma effect" – as reported in in-depth interviews

[27] This variable is calculated using the information on wages per period and number of periods worked by the individual corresponding to the last payment reported in the TLSLS questionnaire. This is chosen in order to separate income effects from possible labour supply effects, namely the likelihood of more educated individuals working more hours, as proposed by Henderson et al. (2011) and Addabbo and Favaro (2011).

[28] Experience is calculated as follows: $t_i = (A_i - s_i - b_i)$ where A_i is the current age, s_i is her number of schooling years and b_i is her age at the beginning of school. In Henderson et al. (2011), potential working experience was calculated as age minus years of schooling minus 6. Addabbo and Favaro (2011, p. 4594) advise caution regarding the use of such a measure of experience, since it does not account for periods of absence from the labour market, due to unemployment, inactivity, illness or even parenthood.

conducted in Timor as factors valued by Timorese students, trainees and employers.[29] The control variables in vector X_i encompass several covariates recommended by the literature on empirics of returns to education. Activity sector and employer type controls are constructed as part of this vector of covariates, accounting for the heterogeneity of job placements, with interrelations between the type of employer and years of education.[30] This approach allows us to assess diverse returns to education depending on type of employer. Employer heterogeneity is also controlled via the number of workers on the job.[31] Intrinsic individual characteristics and skills are also controlled for: gender, knowledge of other languages, household size,[32] migrant status, marital status and ethnicity. Finally, possible geographic segregation of markets is tested by controlling for rural/urban residence and incorporating regional dummies.[33] The conflict variables vector, W_i, includes the following set of covariates: yearly average number of civilians killed or disappeared; yearly average number of deaths due to hunger or illness; years under extreme killings; years under extreme hunger and illness; years in a disputed territory; and years in a territory controlled by the Resistance. All of these are considered in relation to the factor of whether they occurred during school life or during the wider lifetime. These covariates present a significant correlation. Therefore, each variable is tested individually and, only those proven to be significant are tested together.

An empirical analysis of returns to education in a post-conflict setting such as the Timorese has to account for the distinct characteristics of paid workers when compared

[29] This approach builds on studies, documented by Zhu (2011, p. 84) regarding the Chinese labour market, that account for non-linear returns to education through dummy variables that identify different levels of education as Heckman and Li (2004) and Knight and Song (2003).
[30] These follow the works by Willis (1986) and Verhaest and Omey (2011).
[31] As suggested by Verhaest and Omey (2011, p. 7).
[32] The latter is also found in Verhaest and Omey (2011, p. 7).
[33] Following Alves (2012).

with the general population. A selection bias is likely to affect the estimates resulting from an Ordinary Least Squares (OLS) as equation *(1)* expresses, in fact, the expected value of (log) earnings for those individuals with a paid job, i.e.:

$$E(y_i|i\ participates\ in\ the\ formal\ labor\ market).$$

This likely selection bias was first addressed by Gronau (1974) and Heckman (1976). Building on their approach it is possible to test if the experience of violence during the conflict has a significant impact on labour market participation, thus affecting earnings and returns to education. Controlling for this impact, it would be possible to correct for this bias.

Let then P_i be the probability of participating in the labour market, following a process defined by the following equation:

$$P_i = 1\{\alpha_0 + \varphi * Z_i' + \vartheta * Q_i' + v_i > 0\}, (2)$$

where $E(v_i) = 0$, Z_i is a vector of individual, household, industry and region specific control variables: age; gender; years of education; marital status; controls for command of a second language (Indonesian, Portuguese and English) to assess eventual language barriers to the labour market; control for urban/rural residence and regional controls; and controls for ethnicity. In similar fashion to the earnings models, Q_i encompasses all the conflict indicators included in W_i. The results discussed below will be based on OLS and Full Information Maximum Likelihood Heckman Selection Model[34] regressions, clustered at the household level.

Prior to discussing the empirical results, however, it is important to address other relevant sources of bias, particularly due to likely endogeneity of education and of

[34] This approach is inferred by Puhani (2000), among others, to be the best.

conflict. A clear source of endogeneity in education results from the ability bias and stems from the insight drawn out by Spence (1973). If the concern is to evaluate the impact of knowledge and skills received through education upon increased productivity - as measured through efficient wages - then some bias may exist. Higher education may correlate with (unknown) higher intrinsic skills, which in turn, are likely to correlate with a better paid job. This endogeneity effect causes returns to education to be over-estimated.

Reviews such as that of Ashenfelter et al. (1999, p. 454-456) have discussed different approaches proposed to address this type of endogeneity. In particular, there is the explicit introduction of ability proxies as controls. Griliches and Mason (1972) and Griliches (1977) used the result of IQ tests including regressions on siblings or twins considering eventual "sibling/twin effects" (i.e., the presumption that siblings or twins share the same genetically primed ability). Use was also made of Instrument Variable (IV) methodologies, particularly using parents' education as instruments of the person's own education. One may find some grounds to argue that the existing bias does not lead to an erroneous assessment of the economic behaviour of agents. Neither households (when deciding on whether their school-age members should stay in school) nor businesses (when hiring) look for a distinction between the level of schooling acquired and the inherent skills that allowed for such acquisition. Rather, it is the *perception* of higher worth of a (prospective) worker by the (prospective) employer that motivates the latter to award an education premium, as Willis (1986) stressed. If unobserved abilities were to significantly bias the employers' analysis, they would be incurred in costs which would make them observable. In some recruitment processes employers do incur those costs and applicants can be subjected to (psychometric) tests that seek to depict mathematical, logical, reading and writing - and even inter-relational - skills. However,

as documented by Jenkins (2001), Taylor, Kelty and McDonnel (2002) and Williams (2009), while these are now more popular in industrialized countries than ever before, they are still used by only up to half of the employers and mostly only for particular placements (namely in management posts). It is not clear, therefore, that market agents consider an eventual endogeneity bias in education as an obstacle to their best choice (either in relation to hiring or investment in education). This argument however, cannot overshadow the knowledge that ability, being unknown and positively correlated with education and earnings, originates an unobservable variable bias that causes returns to education to be overestimated, if no process is found to account for it.

Ideally, one would seek to make ability observable, namely through IQ tests. However, data limitations do not allow this to be possible when studying post-conflict returns to education in Timor-Leste. Other methods, such as regression discontinuity were found not to be possible as no fitting events were found. This leaves IV as the possible approach, tried empirically in early analysis for this study. Both parents' education attainment levels were explored as instruments. However, two constraints made that endeavour fail. On one hand, TLSLS (2007) data misses information on parents' education for nearly half of the sampled individuals, leading to a significant loss in observations to support the study. On the other hand and more significantly, due to a significant lack of investment in education during Portuguese rule and the difficulties of Indonesian occupation, the average level of attainment of the Timorese is almost insignificant, one year of education and without a significant variance. This made parents' education a very weak instrument. This situation speaks to side reservations that are raised in the review by Heckman and Urzua (2009, p. 17) regarding the application of IV namely: 'weak instruments can give biased estimates', 'IV estimates rest on strong, a priori data assumptions', 'in a heterogeneous model, different

instruments will give different estimates' and 'the IV estimate, depending on the instrument used and assumptions made will give different estimates on the return to education, which are often incorrectly interpreted'. In the same sense, Dickson and Harmon (2011, p. 1118) state: *'[E]stimates of this return vary significantly, depending on the data sets used, the assumptions made and the estimation techniques. In terms of broad methodologies, the focus on the issue of endogeneity often requires identifying assumptions that cannot be empirically tested or are, at best, somewhat fragile in estimation.'*.

With these limitations, an IV approach was also found to not be possible. Under these data constraints, it is advisable to assume that the estimates of returns to education found and presented in the following section are over-estimated.

The introduction of indicators of violence and conflict cannot overlook potential endogeneity. It may be the case that reverse causality does not occur between the variables in the left-hand side of the mincerian equation and the Heckman selection equation, measured in 2007, and the conflict indicators (all reporting to the period 1975 to 1999). However, one cannot overlook reasonable expectations of omitted variable bias or correlated measurement error. A possible omitted variable bias regarding the indicator of intensity of violence, (namely, civilians killed during school year) is the average income at the district level. Following the mincerian equation, this variable is not included in the empirical model. As discussed before, Justino and Verwimp (2006) found that in Rwanda, there was targeting of richer households. In that case, and during the conflict, one could establish reverse causality between earnings and conflict: the richer were targeted, increasing the violence directly affecting them and, endogenously decreasing average earnings. There were reports of FRETILIN elites having been targeted by Indonesian forces and some elite schools being targeted during invasion

(Felgueiras and Martins, 2006). This being the case, income level, during the conflict, would have been a cause of victimization. If income differences were to have been maintained after the conflict, even though there were post-conflict aid policies that targeted and supported those found to be more affected by the conflict, then the earlier income differences may still partly explain post-conflict differences in earnings by district. These differences would be due to economic spill-over effects: the richer districts could have been more hit by the conflict and are still the wealthiest areas. This effect, though, is not clearly apparent. Dili, the richest district in the country was one of the least affected by hunger, while Baucau and Bobonaro, the second and third richest, were among the most affected during the beginning phase of violence. In synthesis, districts where currently earnings are higher, having been relatively richer and more hit than the others during conflict, would show an unobserved bias towards an underestimation of the negative impact of this dimension of conflict.

On the other hand the endurance effects of famines provoked by the actions of protagonists from the Indonesian occupation violence may also correlate with omitted variables. The extreme events of hunger reported in Timor-Leste happened during the invasion period (1975-85) and resulted from the military tactics of encirclement and siege deployed by the Indonesian army (CAVR, 2005). These effects did not directly arise as a cause of the military action itself but as a reaction to the invasion. People fled to mountainous terrains making those the places where siege and forced displacement or village uprooting were more severe. So, although not directly causal, there is a strong correlation between having been born in a more mountainous terrain, being alive in the period 1975-85, and being a victim of the siege tactics. This would have meant experiencing periods of extreme hunger. As the level of internal migration in Timor is extremely low, people were very likely to still live in those same mountainous areas as

in 2007. Most of the more mountainous districts in Timor are also among the poorest, the exception being Baucau (the second richest) which also encompasses the second highest mountain in the country. There may, therefore, be an omitted variable guiding effects such as Timorese experiencing higher prevalence of extreme hunger and also earning lower wages. A negative impact of conflict may therefore be overestimated while an eventual positive effect may be underestimated.

Finally, one may also find omitted variable bias regarding the political control variables. Again, due to terrain conditions, the control of the Resistance was sustained for longer in the most mountainous districts (particularly those furthest to the East) and in those areas where transport infrastructure was least developed in Timor during Portuguese colonization. Although investments were put in place by the Indonesian and - after independence - in the reconstruction efforts, these same conditions remain in these districts of Timor, making them locations of lower participation in the formal labour market. To a lesser extent, these conditions also applied to districts that sustained longer periods of dispute, particularly when compared to those areas where Indonesia sustained longer territorial control. There is, therefore, a possibility of negative effects of conflict on participation in the formal labour market, tested in the first stage of the Heckman selection regression, which may have been overestimated.

While time invariant characteristics were controlled through district level and ethno-linguistic fixed effects, in order to address these sources of endogeneity, an IV approach was applied using the distance to the western border of Timor-Leste with Indonesia as an instrument. This strategy made use of the fact that the Indonesian operations' logistics were systematically supported through their western half of the island of Timor, where, namely a vast number of Timorese were forcefully displaced during the post 1999 referendum violence, as per CAVR (2005). It was also explored by Justino et

al. (2013, 2011). This allowed for stronger control but also more violence to be enacted by Indonesia in the western districts of Timor-Leste while giving more control of the easternmost district to the Resistance and making the central districts spaces where there was a higher degree of dispute. The forms of severe violence were also enabled by this logistical feature, again as reported in CAVR (2005). So, while the efforts of invasion lasted longer in the districts at a greater distance from the western border, as is shown in Figure 3 and Figure 4, above, the destruction enacted in the post-referendum period was stronger closer to the border, where pro-Indonesia militias received more support and were better armed. Therefore, as was described in historical reports, namely Taylor (1999, 1990) and CAVR (2005), the distance to the border is expected to be correlated with the indicators of conflict used. On the other hand, it is important to take into account what are the main economic centres of Timor-Leste - such as the capital Dili and Same closer to the west, Baucau and Lospalos in eastern districts and, finally Maliana near the western border. In these areas there was higher Timorese post-conflict economic activity, higher participation in the formal labour market and greater earnings. The distance of these towns and their districts to the western border differs quite significantly. In fact, there is no significant correlation between the level of economic activity at the district level and the distance to the border. This makes the latter a possible instrument in an IV approach.

The test of the IV approach using distance to the border as an instrument, however, failed to identify empirical evidence of endogeneity. Contrary to what would be expected, the distance to the border revealed itself to be a weak instrument in relation to the variables *civilian killed during school*, *number of school years in disputed districts* and *number of school years in districts controlled by the Resistance*. The Sargan test, however, revealed it to be a good instrument for *years of extreme hunger during school*.

Finally, for all the variables, the instrument failed to fulfil the exclusion restriction. In all cases, the null hypothesis of exogeneity in the Durbin-Wu-Hausman F test cannot be rejected. Therefore, this study is not able to apply an IV approach. However, the biases discussed above must be taken into consideration when analysing the results.

Bearing these data constraints in mind, the empirical model will be used to try and test the theoretical hypothesis presented in section 2. In the next section we will present and discuss the empirical results.

6- Results

Applying the empirical strategy presented in the previous section, it is possible to test the theoretical hypothesis, presented in section 3, that there are two channels through which conflict affects post-conflict earnings and returns to education. The first channel, conflict induced decreases in productivity, should reduce both earnings and returns to education. A second channel, conflict induced scarcity of qualified human resources, should increase earnings and returns to education.

These effects are tested against the backdrop of a baseline model that presumes no effects from conflict. The effects of conflict are then added to the estimation in an attempt to isolate the theoretically presumed channels. The results of the estimations are presented below in Table 10 and Table 11. The models presented are the parsimonious estimations of returns to education, resulting from the test of all covariates referred to in section 5.[35]

[35] While the selection model presented was estimated with all the variables referred to in section 5 above, the following variables were tested and dropped from the earnings models due to lack of statistical significance: number of co-workers; employer type dummies identifying Private Companies, Government, State Enterprises, Self-Employment and Other and respective interaction with Years of Education; dummies identifying completion of primary, pre-secondary, secondary and graduate education; dummies identifying command of English and Indonesian; marital status (1 for married or widow); household size and gender (1 for female).

Before addressing the earnings model, however, it is important to discuss the adequate estimation approach, looking into the Heckman selection models in Table 10. The selection model suggests the following switching variables: age; urban residence; gender (1 for a women); command of Indonesian and English languages; marital status (1 if married or a widow); and the political dimensions of the conflict (number of school years living in a disputed district and living in a district controlled by the Resistance). The signs of the estimates in the selection model follow stylized facts.[36]

The political dimension of the conflict in Timor, presented in sections 2 and 4, appears to affect participation in the labour market. In fact, those were the only conflict-related indicators found to significantly affect participation. The effect they had on earnings is neither direct nor does it directly affect returns to education. However, the indicators suggest that when controlled for other variables - including regional fixed effects - those that lived a higher number of their school years in disputed districts were more likely to participate in the formal post-conflict labour market. Meanwhile, those that lived more school years in districts controlled by the Resistance were less likely to have a role in the labour market.

The first effect may be the result of a higher need for post-conflict reconstruction work in districts that had been contested the longest, as the violence and destruction of infrastructure was most extreme in these locations. As most of the formal employment is linked with either international aid or public administration, this might justify a significant positive correlation. On the other hand, the experience of education in territories controlled by the Resistance had a negative impact on participation in the

[36] I would like to highlight, however, the signal arising from the coefficient on gender, as it suggests segregation in the labour market. This indicates that, in the Timorese economy in 2007, gender based discrimination, while not being significant once women enter the formal labour market, is significant on entry.

formal labour market. This may be derived from a higher probability of exclusion from education and also from employment opportunities during occupation. It also points to an eventual absence of positive discrimination of putative “loyalists”. These interpretations, however, should be validated by further investigation of the political dimensions of the conflict and its relation with the post-conflict labour market.

Table 10: Heckman selection models

	Simple Mincer		Baseline Model		Violence experienced during school year		School years exposed to extreme violence		Both channels	
	(1) OLS β/(se)	(2) Heckman β/(se)	(3) OLS β/(se)	(4) Heckman β/(se)	(5) OLS β/(se)	(6) Heckman β/(se)	(7) OLS β/(se)	(8) Heckman β/(se)	(9) OLS β/(se)	(10) Heckman β/(se)
Heckman Selection Model										
Constant		-3.564***		-3.555***		-3.872***		-3.379***		-3.872***
		(0.135)		(0.135)		(0.150)		(0.133)		(0.150)
Age		0.013***		0.013***		0.014***		0.013***		0.014***
		(0.002)		(0.002)		(0.003)		(0.002)		(0.003)
Years of Education		0.093***		0.093***		0.083***		0.060***		0.083***
		(0.006)		(0.006)		(0.007)		(0.007)		(0.007)
Urban		0.420***		0.422***		0.475***		0.464***		0.475***
		(0.057)		(0.057)		(0.066)		(0.060)		(0.066)
Gender (1 = Woman)		-0.751***		-0.751***		-0.679***		-0.717***		-0.680***
		(0.061)		(0.061)		(0.066)		(0.060)		(0.066)
Speaks Bahasa Indonesian		0.479***		0.475***		0.606***		0.450***		0.606***
		(0.088)		(0.088)		(0.098)		(0.087)		(0.098)
Speaks Portuguese		0.481***		0.474***		0.537***		0.506***		0.537***
		(0.058)		(0.058)		(0.063)		(0.059)		(0.063)
Speaks English		0.153*		0.159**		0.149*		0.189**		0.148*
		(0.079)		(0.079)		(0.082)		(0.081)		(0.082)
Is Married or a Widow(er)		0.975***		0.976***		0.739***		0.783***		0.739***
		(0.086)		(0.086)		(0.100)		(0.095)		(0.100)
Number of school years in disputed districts						0.075***		0.072***		0.074***
						(0.010)		(0.010)		(0.010)
Number of school years in districts controlled by the Resistance						-0.037***		-0.029**		-0.037***
						(0.013)		(0.013)		(0.013)
Individual & Household Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sectorial Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ath ρ		-0.078		-0.191**		-0.251***		-0.192**		-0.242***
		(0.086)		(0.080)		(0.084)		(0.079)		(0.084)
Ln σ		-0.036		-0.104**		-0.109**		-0.100**		-0.112**
		(0.044)		(0.043)		(0.049)		(0.044)		(0.049)
N	1195	20976	1195	20976	1119	20698	1195	20774	1119	20698
R^2	0.050		0.185		0.165		0.187		0.167	
Log-likelihood	-1651.07	-149349.87	-1559.39	-146221.00	-1441.86	-124797.31	-1557.68	-141129.03	-1440.31	-124767.57
χ^2		0.823		5.678		8.948		5.835		8.248
p-value		0.364		0.017		0.003		0.016		0.004

Source: Author's computations using TLSLS (2007) and CAVR (2006); Notes: * p<0.10, ** p<0.05, *** p<0.01

By observing the χ^2 tests in columns (2), (4), (6), (8) and (10) and correspondent p-values it can be established that selection bias affects the OLS estimates, as the hypothesis of independent equations is rejected in all models with the exception of the simplest, and rather incomplete, mincerian formulation in columns (1) and (2). Therefore, the results of the earnings model in Table 11 will focus on the Heckman estimates.

The analysis of the baseline model gives some insights into a post-conflict labour market. The simple mincerian equation (see columns (1) and (2) in Table 11) presents the stylized results, with returns to education amounting to 3.0%-3.9%, in the lower band of comparable countries reviewed in section 2, above. The complete baseline model (see columns (3) and (4) in Table 11) presents some evidences that the average returns to education indicated in the first model do not represent an economy-wide reality but result from some specific factors. There is also evidence of a more than proportional earnings premium being awarded to those that completed technical and vocational training or a postgraduate degree. Those with command of the Portuguese language also seem to have gained a higher wage, when controlling for other factors. It is not clear whether these premiums result from productivity enhancing skills or are, instead, signals of particular market preferences or scarcity of human resources[37]. A final factor is revealed by the decomposition of the earnings structure according to the type of employer. Only two types of employer seemingly have wage profiles that give an education premium: rural public works programmes and NGOs.

[37] This may be the case of the command of Portuguese language having an effect. It was reintroduced in Timor, adopted as official language and initially as language of education after independence. However, only 16% of the TLSLS representative sample stated they could speak it.

Table 11: Mincerian equations

	Simple Mincer		Baseline Model		Violence experienced during school year		School years exposed to extreme violence		Both channels	
	(1) OLS β/(se)	(2) Heckman β/(se)	(3) OLS β/(se)	(4) Heckman β/(se)	(5) OLS β/(se)	(6) Heckman β/(se)	(7) OLS β/(se)	(8) Heckman β/(se)	(9) OLS β/(se)	(10) Heckman β/(se)
Earnings model										
Constant	-1.389***	-1.150***	-1.749***	-1.226***	-1.994***	-1.334***	-1.754***	-1.250***	-1.968***	-1.339***
	(0.189)	(0.327)	(0.339)	(0.406)	(0.369)	(0.476)	(0.358)	(0.445)	(0.378)	(0.485)
Years of Education	0.039***	0.030**	0.015	-0.002	0.037***	0.013	0.017	-0.002	0.037***	0.014
	(0.011)	(0.014)	(0.012)	(0.014)	(0.014)	(0.017)	(0.012)	(0.014)	(0.014)	(0.017)
Experience	0.032***	0.029**	0.017*	0.008	0.017	0.003	0.014	0.003	0.015	0.002
	(0.010)	(0.011)	(0.010)	(0.010)	(0.012)	(0.014)	(0.011)	(0.013)	(0.012)	(0.014)
Experiences^2	-0.001***	-0.001***	-0.000**	-0.000*	-0.000	-0.000	-0.000*	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Finished Vocational School			0.336**	0.356**	0.319**	0.430**	0.340**	0.431**	0.342**	0.442**
			(0.147)	(0.165)	(0.151)	(0.189)	(0.151)	(0.171)	(0.156)	(0.193)
Finished Graduate School			0.775***	0.701***	0.642**	0.549**	0.782***	0.709***	0.671**	0.577**
			(0.252)	(0.242)	(0.277)	(0.267)	(0.263)	(0.256)	(0.287)	(0.274)
Works in a Rural Public Works			-0.722***	-0.712***	-0.157	-0.189	-0.734***	-0.729***	-0.198	-0.219
Programme (RPW)			(0.248)	(0.237)	(0.292)	(0.284)	(0.236)	(0.228)	(0.285)	(0.279)
Education x (RPW)			0.037*	0.037*	-0.007	-0.003	0.038*	0.039**	-0.004	-0.001
			(0.020)	(0.019)	(0.022)	(0.022)	(0.019)	(0.019)	(0.022)	(0.021)
Works in an NGO (NGO)			-0.398	-0.420*	-0.447	-0.502*	-0.398	-0.433*	-0.460	-0.509*
			(0.248)	(0.247)	(0.290)	(0.286)	(0.248)	(0.249)	(0.291)	(0.287)
Education x (NGO)			0.042*	0.044**	0.046*	0.051**	0.043*	0.047**	0.046*	0.051**
			(0.022)	(0.022)	(0.025)	(0.025)	(0.022)	(0.022)	(0.025)	(0.025)
(A) Yearly average kills and disappearances during school years in the birth district					0.008	0.009			0.005	0.007
					(0.006)	(0.006)			(0.007)	(0.007)
Education x (A)					-0.001	-0.001*			-0.001	-0.001
					(0.001)	(0.001)			(0.001)	(0.001)
(B) Number of school years experiencing extreme deaths by hunger/illness in the birth district							0.146*	0.129*	0.138	0.104
							(0.081)	(0.078)	(0.097)	(0.094)
Education x (B)							-0.011*	-0.010	-0.008	-0.006
							(0.006)	(0.006)	(0.007)	(0.007)
Individual & Household Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sectorial Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author's computations using TLSLS 2007 and CAVR 2006; Notes: * p<0.10, ** p<0.05, *** p<0.01

These results, which hold in almost all the empirical models analysed in Table 11, are important because they may reflect an important distortion in the labour market of Timor and eventually those in other post-conflict countries. They are particularly important because these two employers represent the "aid industry" in Timor and because the empirical models show no significant returns to education for other types of employment. Notably, there are no significant returns to education for the average worker of the main employer – the Timorese Government.

The introduction of conflict indicators in the empirical mincerian models, in columns (5) to (10), completes the analysis of the Timorese labour market as a case study of a post-conflict setting. Having tested the set of indicators of conflict described in sections 2 and 4, this study only finds two dimensions of the Timorese conflict that may have affected earnings and returns to education. These factors are, first, yearly average kills and disappearances, during school years and in the birth district (see columns (5), (6), (9) and (10) in Table 11); and, second, the number of school years in which there had been an experience of extreme deaths by hunger/illness in the birth district (see columns (7), (8), (9) and (10) in Table 11). Notably, this study only finds evidence of significant impacts from violence being experienced on earnings and returns to education if that violence was experienced during the school years.

The significant dimension of the Timorese conflict relates to levels of physical violence experienced during the school years. As per Table 9, an average Timorese paid worker lived her school years in an environment where 12 people per year (1 per month) were killed because of Indonesian military operations, Resistance actions or other conflict-related events. This experience closely correlates with impacts experienced in the households, such as the loss of family members or having a member with a disability (Evans and Miguel, 2007; Ibáñez and Moya, 2006; Justino, 2009). It also correlates with

impacts experienced in the area of residence and education, with similar effect factors such as the destruction of infrastructure or increased difficulty in accessing education (Ichino and Winter-Ebmer, 2004; Lai and Thyne, 2007). The coefficients of the interaction between the first indicator of violence and years of education (in columns (5) and (6)) point to a correlative reduction of the returns to education of 0.1 per cent per person killed in every year of education. An average Timorese would experience, therefore, a reduction of 1.2 per cent in the absolute value of returns to education due to the exposure to violence (killings and disappearances) in her birth district during her school years. This evidence is in accordance with the first theoretically hypothesized channel of impact, through which conflict may affect earnings and returns to education.

The second dimension of the conflict relates to extreme events experienced by the Timorese during the conflict, namely extreme deaths due to hunger and illness. Although it correlates with the previous dimension, what is analysed here is the length of time during which extreme levels of violence, or their consequences, were experienced by the individual and during her school life. In particular, this second significant dimension of conflict is the number of school years during which the individual witnessed extreme numbers of deaths due to hunger and illness in her birth district. As reported in section 2, the periods of extreme levels of hunger and death by illness during the Timorese conflict happened in the first period, namely, during the invasion and consolidation of the Indonesian military power. They correlated with forced displacements (inside the same district or even subdistrict) and burnings of crops (CAVR, 2005). The level of disruption of livelihoods was extreme. Reports from interviewed Timorese during field research speak of a period where many families spent periods of months in the woods, with poor nourishment and either little or no access to schooling (in the form of popular education provided by volunteers and resistance

fighters). Looking at column (8) in Table 11, there seems to be no evidence of a significant impact of this dimension from the Timorese conflict on post-conflict returns to education.[38] However, there is an estimated significant increase of 0.13 in the log of hourly wage earnings, or 1.14 USD in the hourly wage per year, related to extreme violence experienced, from an average wage of 1.16 USD, as presented in Table 11, above. This evidence seems to partially support the theoretical hypothesis of a scarcity effect on earnings but not on returns to education.

Columns (9) and (10) present an attempt to test the effects of both conflict dimensions previously discussed, by including them in the same empirical model. Although the signs of the coefficients are maintained, the high correlation between the two channels gives them loose statistical significance. An investigation into what channel is more prevalent may be conducted in other settings, where this colinearity is less prevalent.

As mentioned before, the impacts of conflict were empirically tested against the backdrop of a comprehensive empirical mincerian model, presented in columns (3) and (4), and expanded in the remaining columns of Table 11, through the addition of the conflict indicators. Table 11 shows only the significant conflict indicators.

[38] The OLS estimation would suggest negative and significant negative effects (1% reduction per year of extreme conflict experienced). The Heckman estimate is of the same value but not significant.

Table 12: Robustness tests in Returns to Education: testing the robustness of conflict variables

	Simple Mincer		Adding Signals		Adding individual and household controls		Adding regional, sectorial and employer type controls		Adding ethnicity controls (complete model)	
	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)
Earnings Model										
(A) Yearly average kills and disappearances during school years	0.0093	0.0102	0.0092	0.0102	0.0102	0.0110	0.0102	0.0113*	0.0081	0.0094
	(0.0076)	(0.0076)	(0.0076)	(0.0076)	(0.0077)	(0.0077)	(0.0071)	(0.0065)	(0.0064)	(0.0060)
Education x (A)	-0.0012	-0.0012*	-0.0011	-0.0012*	-0.0013*	-0.0013*	-0.0011	-0.0013**	-0.0009	-0.0011*
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0006)
(B) Number of school years experiencing extreme deaths by hunger/illness in the birth district	0.1614*	0.1608*	0.1590*	0.1593*	0.1577*	0.1633*	0.1814**	0.1676**	0.1463*	0.1293*
	(0.0878)	(0.0860)	(0.0879)	(0.0860)	(0.0868)	(0.0853)	(0.0822)	(0.0795)	(0.0808)	(0.0780)
Education x (B)	-0.0115	-0.0113	-0.0111	-0.0111	-0.0118*	-0.0121*	-0.0127*	-0.0121*	-0.0107*	-0.0099
	(0.0072)	(0.0071)	(0.0072)	(0.0071)	(0.0071)	(0.0070)	(0.0066)	(0.0065)	(0.0064)	(0.0062)

Source: Author's computations using TLSLS (2007) and CAVR (2006); Note: These robustness tests use the Heckman Selection model equation estimated in the main regressions; * p<0.10, ** p<0.05, *** p<0.01.

A set of tests was devised to assess whether the results were robust. A first test analyses whether the coefficients of indicators related with conflict are affected by the introduction of those covariates that construct the baseline model. As is noticeable in Table 12, above, the value of the coefficients does not change significantly.

Another robustness test focuses on the assumptions used to construct some of the covariates. The main assumption relates to the age of enrolment in school. The analysis presumes an enrolment age of six. According to official Timorese indicators (Ministry of Education, 2012), the average age at enrolment at the beginning of the 2012/13 school year was 6.4 years, with an upper-bound in the in the 1 per cent significance confidence interval of 7.9 years. Robustness checks are performed on all variables that were constructed using age of enrolment assumptions: experience and experience squared; average levels of violence experienced during the school years; years of extreme violence experienced during the school years; number of school years living in a disputed district; and living in a district controlled by the resistance. In Table 13 it can be seen that assuming the age of entry to be seven or eight years old does not alter the values of the coefficients greatly and, in fact, suggests higher statistical significance.

Table 13: Robustness tests in Returns to Education: testing the robustness to alternative age of entry

Conflict channel	Violence experienced during school years						School years exposed to extreme violence					
Enrolment at age	6		7		8		6		7		8	
	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)
Earnings Model												
(A) Yearly average kills and disappearances Violence experienced during school years	0.0081 (0.0064)	0.0094 (0.0060)	0.0138* (0.0071)	0.0149** (0.0068)	0.0136*** (0.0041)	0.0143*** (0.0039)						
Education x (A)	-0.0009 (0.0007)	-0.0011* (0.0006)	-0.0013* (0.0007)	-0.0015** (0.0007)	-0.0014*** (0.0005)	-0.0015*** (0.0005)						
(B) Number of school years experiencing extreme deaths by hunger/illness in the birth district							0.1463* (0.0808)	0.1293* (0.0780)	0.1726** (0.0824)	0.1536* (0.0808)	0.1962** (0.0911)	0.1746* (0.0902)
Education x (B)							-0.0107* (0.0064)	-0.0099 (0.0062)	-0.0123* (0.0064)	-0.0112* (0.0063)	-0.0139** (0.0070)	-0.0125* (0.0070)
Heckman Selection Model												
Number of school years in disputed districts		0.0746*** (0.0104)		0.0730*** (0.0104)		0.0703*** (0.0102)		0.0719*** (0.0100)		0.0701*** (0.0100)		0.0671*** (0.0098)
Number of school years in districts controlled by the Resistance		-0.0370*** (0.0132)		-0.0348*** (0.0134)		-0.0314** (0.0137)		-0.0290** (0.0128)		-0.0267** (0.0130)		-0.0237* (0.0132)

Source: Author's computations using TLSLS (2007) and CAVR (2006); Note: These robustness tests use the Heckman Selection model equation estimated in the main regressions; * p<0.10, ** p<0.05, *** p<0.01.

A final robustness test focuses on the assumption of extreme violence. The empirical model assumes that violence in one year and one district is extreme if the indicator of interest exceeded the mean for all years and districts by two standard deviations or more. Under an assumption of normally distributed observations, that would mean that 97.5 per cent of the observations are below that value. Robustness tests are conducted assuming two other alternative thresholds: an excess of one standard deviation and an excess of three standard deviations above the mean. This test only applies to the indicator of the number of years under extreme levels of deaths by hunger and illness in the district. As would be expected, one can notice in Table 14 that the values of the coefficients tend to increase as the threshold is set higher, while keeping close to the estimations presented above. There are indications, however, that a threshold of only one standard deviation in excess of the mean would be insufficient to signal extremely disruptive levels of violence.

Considering the evidence from the tests conducted, the empirical results of this study appear to be robust.

Table 14: Regression Estimates of Returns to Education – Robustness test – Threshold of Extreme Violence

Threshold of extreme violence	Mean + 1 Standard deviation		Mean + 2 Standard deviation (baseline)		Mean + 3 Standard deviation	
	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)	OLS β/(se)	Heckman β/(se)
Earnings Model						
(B) Number of school years experiencing extreme	0.1252*	0.1090	0.1463*	0.1293*	0.2013*	0.1872*
deaths by hunger/illness in the birth district	(0.0720)	(0.0693)	(0.0808)	(0.0780)	(0.1107)	(0.1039)
Education x (B)	-0.0092	-0.0085	-0.0107*	-0.0099	-0.0150*	-0.0146*
	(0.0057)	(0.0055)	(0.0064)	(0.0062)	(0.0091)	(0.0086)

Source: Author's computations using TLSLS 2007 and CAVR (2006); Note: These robustness tests use the Heckman Selection model equation estimated in the main regressions; * p<0.10, ** p<0.05, *** p<0.01.

7- Conclusion

Post-conflict countries look to education with hope, as a signal of re-acquired normality, a tool for reconstruction, and an investment in a future without conflict. This hope, however, has to be matched by the construction of a post-conflict economy that provides the needed incentives for education. This chapter analysed the effect of conflict on returns to education in Timor-Leste a few years after the end of 25 years of violent military occupation.

The evidence uncovered in this study points to some significant results. It indicates that forms of violence experienced during the school life of individuals reduce the returns they could otherwise take from further years of education. It also indicates that the experience of extreme levels of violence - and the disruption to livelihoods and access to education arising from this - may create a scarcity of human resources, making them more expensive. This happens while their productivity has lowered due to the effects of the factors in the first channel. Evidence also points to an indication that political conditions under which education occurred also affected the participation in the post-conflict labour market. The evidence of a scarcer (and therefore more expensive), less qualified labour force, arising as a consequence of violence makes it evident that conflict reduces the economic incentives for education. This may explain why a post-conflict country is likely to have lower returns to education than other, comparable, countries.

This study also shows that the challenges to the promotion of higher investment in education in a post-conflict country happen not only because of the conflict its people experienced but also because of the economic post-conflict setting. The Timorese evidence points out that returns to education are only significant for those involved in professional projects currently funded and supported by international cooperation

efforts, either directly in NGOs or in public projects originated and funded by international initiatives. This may not be a surprising result. Public administrations are generally bounded by the social contract not to have extremely high wages while securing “fair” (usually higher than market) wages for less qualified work. It is, in general, the private sector that tends to generate the income incentives for education. However, as previously signalled, post-conflict countries tend to have a depressed private sector. If not surprising, this situation creates a distortion in the labour market, drawing the most qualified labour out of national organizations and the national economy. It also provides signals that preferable learning options for young Timorese will be those academic programmes that are more likely to increase their employability in projects supported by international aid programmes. This acts to the detriment of both the national government and national private initiatives. In settings of economic and governance fragility, the insights provided by the evidence collected here should drive the actors of international development cooperation and national governments to analyse and improve both hiring and remuneration policies, particularly for those relatively few people with higher qualifications. Failing to do so may endanger the contribution of education to strengthening post-conflict countries. It may lead, instead to brain-drain dynamics and to a public service provision competition between international actors and (the body that needs to be the ultimate provider) the State. In the end, instead of strengthening the process of peace-building and reconstruction, it may lead to new forms of fragility.

Chapter 2: Medium-run legacies of conflict affecting the demand for primary education: The case of post-conflict Timor-Leste[39]

In 1990, at Jomtien, the international community committed itself to Universal Primary Education as it launched the Education for All (EFA) initiative. This ambitious goal was to be transcribed into the Millennium Development Goals, and is still present in the current discussions of the post-2015 Sustainable Development Goals. Education is undeniably a policy priority in international development.

National commitments toward education have manifested themselves beyond the letters and words of statements, and are evidenced in positive achievements. Most recent statistics suggest a significant improvement in primary school enrolment in developing countries, reaching 90% in 2010, up from 82% in 1999. However, this positive story does not seem to resonate in the same way in conflict affected countries. Losses in education are among some of the devastating legacies of conflict. In its Education for All Global Monitoring Report dedicated to conflict, UNESCO (2011) reported the dire situation in *Fragile and Conflict Afflicted States (FCAS)*. Although it only reported 35 countries as FCAS, these encompassed 42% of all children of primary school age out of school in 2011, a total surpassing 28 million. More recent evidence, reported by Winthrop and Matsui (2013), found that a child living in a low income "fragile state" is three times as likely not to attend school than one living in a peaceful low income country.

[39] I would like to thank Patricia Justino, Edoardo Masset, Lawrence Haddad, Jean-Pierre Tranchant, Yashodhan Ghorpade, Annemie Maertens, Iftikhar Hussain, Panu Pelkonen, Jan Willem Gunning Hector Rufrancos, Ani Silwal, Lucia Barbone, Máiréad Dunne, Kwame Akyeampong, Tony Somerset, Jimena Hernandez-Fernandez, Eva-Maria Eger, Fatema Rajabali and Rhiannon McCluskey for their comments and feedback on this and earlier versions.

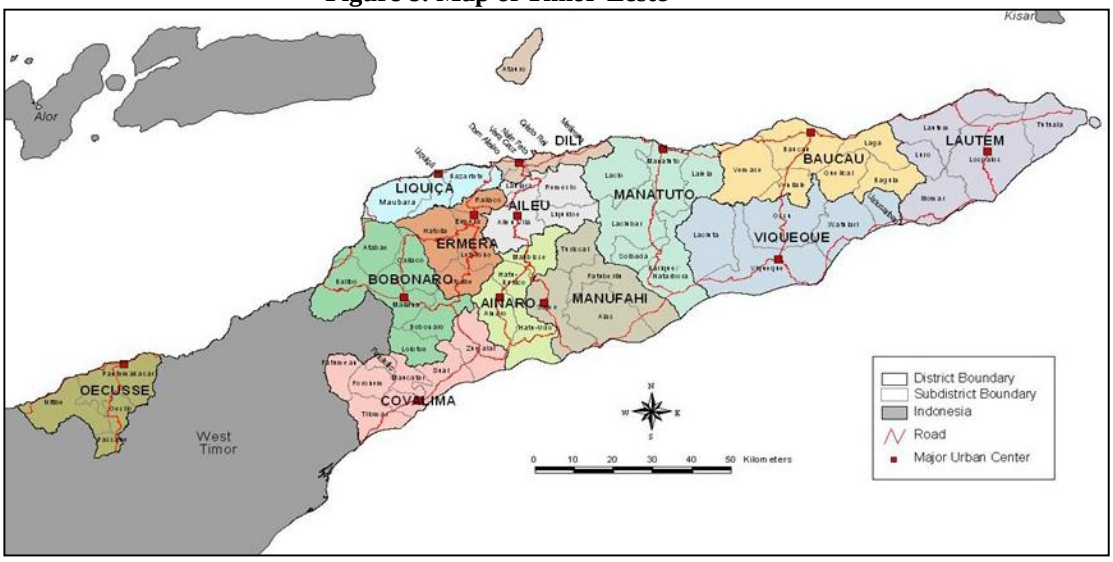
Although it is clear that "fragile states" face severe challenges in education, there is still much to learn and understand about the mechanisms through which legacies of conflict manifest themselves, particularly as time from the conflict elapses and especially in the case of primary education. This study seeks to provide insight into the persistent impacts of conflict in decisions regarding primary education, particularly in the medium-run. It will look specifically at revealed demand for education, expressed as the decision to have a child attend primary school after five years had passed from the end of conflict. As evidence, it will use the case of Timor-Leste, and the nationwide living standards survey conducted in 2006-07 by the Timorese National Statistics Bureau (TLSLS, 2007). Supported by the World Bank and UNICEF, the survey inquired on school attendance among other topics. Accounting for a likely endogeneity of conflict, this study tries to infer its effects on demand for primary education. It finds evidence that the household's income and the quality of education are significant drivers of the attendance of primary school by children and likely channels of influence of conflict on demand for education. It finds also evidence that, beyond these effects, a possible higher preference for primary education may exist among those that were more affected by conflict. This empirical evidence, however, was found not to be robust.

The study is structured as follows. Section 2 will provide a brief description of Timor-Leste and its conflict in order to set the background. In section 3, the conceptual framework supporting the analysis will be presented, followed by the empirical strategy in section 4. Section 5 describes the data, while section 6 presents the empirical results. A discussion of the results will conclude the paper, offering reflections on the empirical methodology as well as avenues for future research.

1- Background

Timor-Leste is still the youngest nation in Asia. With a relatively small territory of 14,919 km^2, it became officially independent in May 2003. Timor-Leste, henceforth referred as Timor, is a half-island (see Figure 8 below) neighbouring Indonesia by sea in the North and East, by sea and land in the West (including the western half of the island), and Australia, by sea, in the South. With an estimated population of 1.2 million in 2012, this former Portuguese colony had previously experienced a very short moment of independence in November 28th 1975, lasting only one week. An invasion from Indonesia brutally ended it.

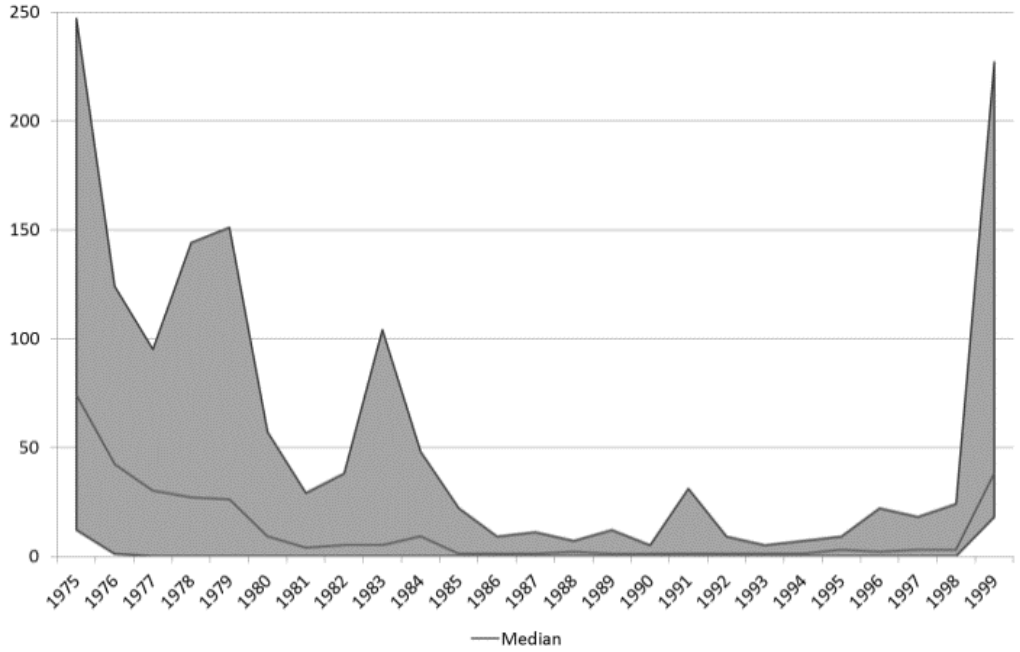
Figure 8: Map of Timor-Leste



Source: DNE (2008)

For the next 25 years, Timor-Leste lived under a military occupation by the then Indonesian dictatorship of President Suharto. The Timorese had to endure continuous violent oppression ranging at different scales of impact across the small country. At times and in some districts, the levels of violence reached extreme heights, particularly with regard to the number of killings and disappearances perpetrated by the Indonesian army and pro-Indonesia Timorese militias supported by the occupying power. This can be seen in Figure 9, below.

Figure 9: Civilian killed and disappearances in each year (maximum, median and minimum)



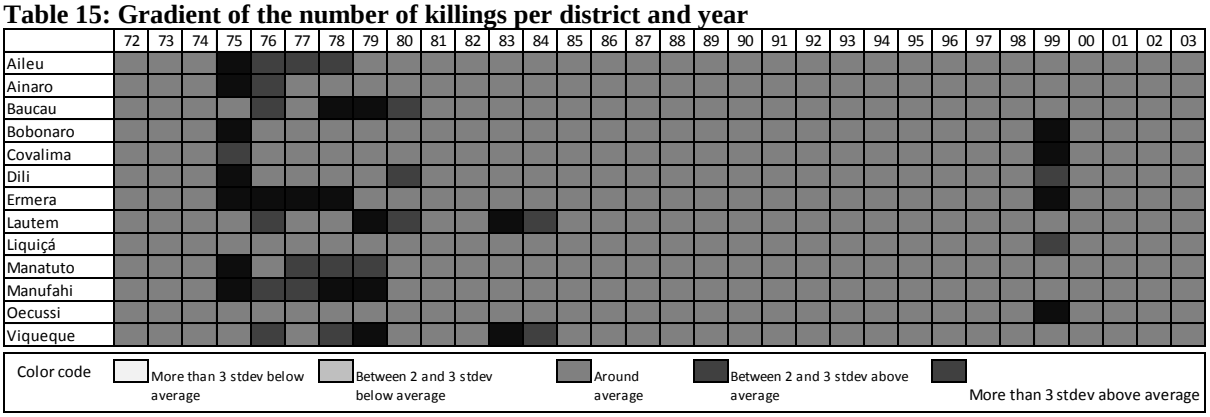
Source: Author's calculations based on CAVR (2006)

These events were thoroughly documented by the Timorese Truth and Reconciliation Commission, giving rise to a dense and ample report of the history of events (CAVR, 2005) and a dataset of reported human rights abuses (CAVR, 2006). It was also documented in the historical research conducted by Taylor (1990, 1999), Gunn (1999) and Mattoso (2005) and in the memoirs of those who lived through the process. This included authors such as Felgueiras and Martins (2006) and Carrascalão (2012). This period came to an end when, in the process of democratization undertaken by Indonesia and in the face of international pressure, President B. J. Habibie agreed on a referendum to decide whether the Timorese would desire a status of autonomy within Indonesia. If they refused, Indonesia would recognize the full independence of Timor. In August 1999, 78.5% of the voters, from a turnout of 98.6%, voted against autonomy. Hence, Timor was to become independent.

The cloud of occupation would not lift without a final bout of brutality. Both before and during the referendum campaign, pro-Indonesia militia increased their violence, a tactic

used to scare possible pro-independence activists and to assure a pro-autonomy vote (CAVR, 2005). With the victory of the independence voters, a brutal backlash ensued, reaching levels Timor had only witnessed in the period of invasion, as it can be seen in Figure 9, above[40]. The levels of killings and disappearances were extreme in many districts (as it can be seen in Table 15, below). Most notably those living in Bobonaro, Covalima, Ermera and Oecussi suffered the most, but those living in Dili and Liquiçá also witnessed high levels of violence. In all these districts the levels of killings in 1999 were in excess of the already significant average by two or even three standard deviations.

Table 15: Gradient of the number of killings per district and year



Source: Author's calculations using CAVR (2006) data

Nonetheless, even in districts that did not experience these extreme levels of violence in 1999, the later period of Indonesian occupation was one where violence, as a continuous experience intensified, as presented in Figure 9.

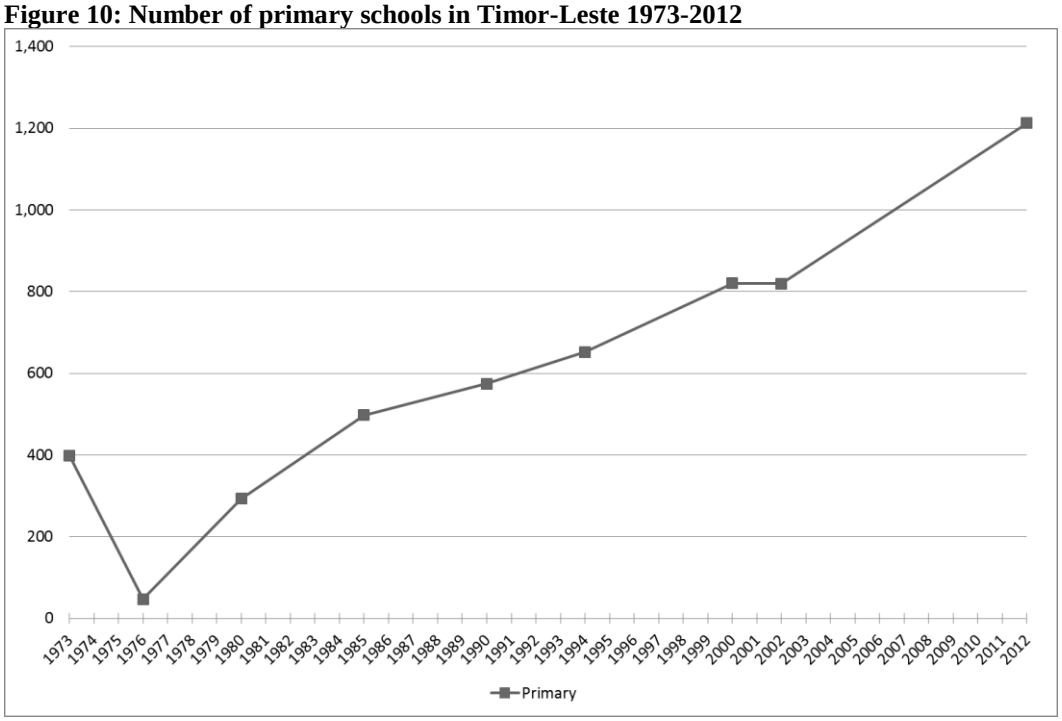
Yet, Timor had chosen its independence and, under the protection of the UN, led by Australia and with the support of the United States, Japan, Portugal and Brazil, among

[40] The 1999 post-referendum violence took the form not only of killings but of significant property destruction, with scorched-earth practices and forced displacement, also reported in CAVR (2005). These effects were reported and surveyed in the 2001 Timor-Leste Living Standards Survey but, unfortunately, were not the object of a new enquiry in 2007. Meanwhile most of the displaced population is reported to have returned to their birth districts, as suggested in TLSLS (2007) and the 2010 census (National Statistics Directorate and UNFPA, 2011) and most of the reconstruction process is reported to have taken place.

others, security was re-established and a period of governance transition, under the transitory administration of the UN (1999 to 2003) followed. This was a period of reconstruction and significant aid investment in a number of sectors, including education; this led to a significant expansion in the number of schools, particularly since 2003, as highlighted in Figure 10, below.

This expansion of available schools was supported by multilateral and bilateral donors, as highlighted by Nicolai (2004), namely: the World Bank; Portugal; UNICEF; the World Food Programme; New Zealand; Brazil and Ireland. Nicolai (2004) goes further, stating that during the UN Transition Administration of Timor (1999-2003), UNICEF played the role of de facto Ministry of Education. Lately, Australia has also committed to the support of Timorese education.

Figure 10: Number of primary schools in Timor-Leste 1973-2012



Sources: INE (1974); BPS (1989, 1993); Saldanha (1994); GERTIL, (2003) and Ministry of Education (2012)

When the school year of 2004/05 started, five years had already elapsed from the end of Indonesian occupation and the extreme events of violence witnessed by the Timorese in 1999. Reconstruction was ongoing; the hope of peace had reached Timor.

Yet, as Prime Minister Xanana Gusmão reminded the nation in 2010, Timor was, and still is, a post-conflict country, and the experience of conflict left its mark:

> *'Post-conflict mentality is a collective reality that cannot be ignored when a nation has endured the severity of losses, faced the realities of past injustices, and experienced generations of conflict. This painful legacy is not often included when considering strategic planning.'*
>
> Office of the Prime Minister, (2010:6)

This study seeks to directly address this concern by reviewing and further analysing legacies of conflict upon the drivers of demand for primary education in a post-conflict setting. A brief conceptual review follows, in the next section.

2- Conceptual Framework

To support the analysis, it is important to look into the processes through which the experience of violence and conflict can induce differences in demand for education among otherwise similar individuals. The focus here will be placed on demand for primary education as an economic choice of the household, made on behalf of its child.

A first reflection must therefore be on how conflict may affect demand for education in post-conflict situations. From a general perspective, most of the studies on conflict and education suggest there is a negative impact[41]. FitzGerald, Stewart and Wang (2001) and F. Stewart and FitzGerald (2001) point out that school enrolments either decrease in conflict-afflicted countries or increase less comparatively to other poor developing countries. By a similar token, Blattman and Annan (2010) on Uganda, Shemyakina (2011) in Tajiskistan, Akresh and de Walque (2008) in an examination of the impacts of

[41] Carlton-Ford and Boop (2010), Kondylis (2010) and de Groot and Göksel (2011) review some of these results.

the Rwandan genocide and Swee (2009) on Bosnia, all find negative impacts. Specifically looking at Timor, Justino et al. (2013) analysed school attendance in the immediacy of independence (school year 2000/01) when still under UN transitional administration. They found that exposure to displacement and damage to houses during the last bout of extreme violence of 1999 induced a significant lower attendance in the first year post-conflict. They also found evidence of mixed impacts of conflict on school attainment seven years after independence. In 2007, boys affected by violence were less likely to have completed primary school, while girls affected by conflict were more likely to have finished their primary education. Frances Stewart, Huang, and Wang (2001) had already found mixed results for changes in primary school enrolments in conflict countries, a result that seems to be confirmed by Justino et al. (2013). Focusing on demand for education - manifested through the choice of having children attend school - this study built on this last contribution, and sought to verify whether or not the short-run effects of conflict on revealed demand for primary education that was manifested in 2001 still persisted in 2004/5. It did this by making use of a richer dataset to try to infer possible impacts and to deepen the contextual analysis of demand in a post-conflict setting.

In the search for a deeper analysis of impacts of conflict it will be helpful to acknowledge processes through which conflict may affect household preferences towards education. Two dual psychosocial dimensions may arise as a consequence of the violence that take place during a conflict: trauma and resilience. Each can, in turn, be reflected in post-conflict preferences regarding education.

On one hand we have trauma. The United Nations' Report on the Impact of Armed Conflict on Children (Machel, 1996), refers to psychosocial impact as one of the most significant impacts of conflict on children, together with factors such as threats to health

(namely HIV-AIDS), gender based exploitation and violence, malnutrition[42] and disease. The emergence of post-traumatic stress due to conflict is also highlighted by Dyregrov et al. (2002) and, in the specific case of Timor-Leste, by Silove et al. (2009). These effects on children can shape their attitudes towards the realities of schooling, including the meeting of new colleagues, the engagement in different environments and the mere issue of getting to school. The general assumption of intra-household altruism leads us to assume that children's perceptions of school will also have a bearing on their parent's own appreciation of the risks. Parents themselves, together with the other adults in the household, can also become more fearful about the security of their children. Skonhoft (2000), who researched Burundian Hutu refugees, found that in the face of the slaughtering of educated people of the same ethnicity, many parents became reluctant to send their children to school, even in refugee camps. These changes in households' perception can, as found in Burundi, have defining effects on the way parents value the utility that can be derived from their children's schooling. It can ultimately lead them not to have their children attend school. Other effects were empirically found to result from an experience of violence and conflict. Higher pessimism (Bozzoli et al., 2011) and higher sensitivity to uncertainty (Shemyakina, 2011) can also be results of violence and conflict.

These effects, as Silove et al. (2009) found, can outlast the conflict itself and still be felt in the post-conflict setting. The effects are thus compounded in the post conflict setting where they may lead to a reduced preference for education among those most affected by conflict.

[42] The relevance of malnutrition and food security in conflict and post-conflict settings is addressed in significant research by Breisinger et al. (2014), Calderone et al. (2014) or Maystadt et al. (2014).

On the other hand, conflict can induce resilience, as stressed by Blattman and Annan, (2010) or Bellows and Miguel (2009). Referring to the work of Tedeschi and Calhoun (1996) and Powell et al. (2003), Bellows and Miguel (2009) suggest that positive changes in political agency and beliefs may arise from conflict, which, arguably, can be construed as resilience effects. If resilience effects dominate, then surviving a conflict may induce a peace dividend in the form of positive aspirations, and thus lead eventually to a lower risk aversion and a longer foresight. Resilience may also be fostered in the aftermath of the conflict through reconstruction aid efforts targeted to areas and people more affected. These resilience effects may include the fostering of gender equality, in the case of Timor, as was found by Olsson (2009).

An analysis of impacts of conflict and violence on post-conflict behaviours, particularly in the case of forms of direct violence such as killings, is always an analysis of survivors, of individuals that experienced an environment where the level of killings *of others* was more or less intense. This experience can then take two different forms: it can either involve, first, the experience of a continuum of violence or, second, a shock (or a succession of shocks) of violence experienced during one's life or the life of one's child. In both cases, the experiences can induce trauma and/or resilience. However, while an experience of a continuum of violence may lead to adaptation and coping strategies that can eventually lead to resilience, the experience of a shock of extreme violence may be more likely to lead to trauma. On the other hand, if factors of resilience are to be strong enough so as to overcome the trauma induced by shocks of extreme violence, then they are also likely to prevail against the trauma induced by experiences of continua of violence. In such a case, one should expect that, in a post-conflict situation, positive reactions to the experience of conflict, namely expressed through the choice of having the child attend primary education, would prevail.

Qualitative research undertaken in Timor in 2012, where life stories interviews were conducted with Timorese in regions differently affected by the conflict[43], suggests that the resilience effect may not be negligible. In all the interviews conducted, a high preference for education and an assertion that it is of great importance was revealed, both by young people interviewed and by parents, regarding their children. As an example of what could be perceived as a change in attitudes towards education, from the in-conflict to the post-conflict setting, these were the words of a young man from the *suco* of *Parlamento* in the district of Lautém:

> *'School didn't go well but that was war strategy. We wouldn't put effort in school. Now after independence, it is amazing! Now school is really good! (…) Before, in Indonesian times, no one would organize or mobilize life towards becoming someone. (…) Our mothers would also not want [us to go] because of the war: «you go to school and then they will kill you». (…) Now school is a success!'*
>
> *Young Man from Lautem (2012)*[44]

The suggestion is, therefore, that a possible effect of resilience could be influencing the decisions of Timorese as a possible medium-run impact of conflict, or a peace dividend.

However, a more definite assertion can only be made against the backdrop of a set of other factors that may also influence the choice of having a child attend primary school. A first important factor is, of course, the parents' own experience of education, whether they attended school themselves. These are also important shapers of the household's preferences towards education.

It is also important to assert that households' perceptions of the utility of education reveal themselves in choices that are guided by a broad set of other concerns and restrictions, as highlighted by the theory and empirics of demand for education.

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[43] A total of 24 life stories interviews were conducted in three sites: Bazartete in the district of Liquiça, in the West; Laclubar in the district of Manatuto, in the Centre; Lautem in the district of the same name, in the East.

[44] Underlining added by the author.

Starting from the works of Mincer (1958), Schultz (1961), Becker, (1962) and Ben-Porath (1967), the economic problem of demand for education is constructed by considering the household to be facing an investment decision, an investment in human capital. As with other investments, education is expected to generate a yield. In this case, it is expected to generate an education premium, a higher wage relative to comparably similar workers in comparable sectors and economies, for each added year of schooling (Becker, 1962). Higher returns to education provide a metric for this premium, an indicator that education pays as an investment (Becker, 1962; Mincer, 1974, 1958)[45]. It is, therefore, an expectation of positive and significant returns to education that constitutes the economic incentive for households' demand for the education of their members[46].

The economic analysis of demand for education acknowledges that, as an investment, a choice of having some of the household's members attend school is one where contemporaneous costs are assumed, so that future gains can be attained. This has been clear since the seminal works of Becker (1962) or Ben-Porath (1967), but also Wilkinson (1966), Heckman (1976), Lazear (1977) or Mattila (1982).[47] Education

[45] However, it does not equate to a return on investment, as it does not relate the wage premium to the costs of education.

[46] The links between returns to education and demand for education have been recently reviewed by Colclough et al. (2010). Returns to education were recently found to be significant determinants of demand by Kingdon and Theopold (2008) on India, Brand and Xie (2010) on China or Attanasio and Kaufmann (2014) on Mexico.

[47] A thorough review of the seminal literature in demand for education can be found in Freeman (1987). Literature on demand for education has expanded, with a focus, mostly on higher education. Important examples are Willis and Rosen (1978), Fuller et al., (1982), Manski and Wise (1983), Altonji (1991), Manski (1993), Duchesne and Nonneman, (1998), Cameron and Heckman (2001), Canton and de Jong (2005) ,Saiti and Prokopiadou (2008), Brand and Xie (2010), Flannery and O'Donoghue, (2013), Delavande and Zafar (2014) or Prada and Urzúa (2014). A review of econometric studies on higher education can be found in Ehrenberg (2004). Recent empirical applications in developing countries can be found in King (1993) on higher education in Puerto Rico, Kingdon and Theopold (2008) on India, Lloyd et al., (2009) on Pakistan, Nerman and Owens, (2010) on Tanzania, Oketch and Ngware (2010), Oketch et al. (2012) and Bold et al. (2014) on primary education in Kenya, Weir (2011) on Ethiopia, Chow and Shen (2006), Qian and Smyth (2011) and Deng et al. (2014) on China, Jensen (2010) on the Dominican Republic, Stephen (2012) on Nigeria, Glewwe and Kassouf, (2012) on Brazil, Albert and David (2012) on primary education in the Philippines, Biltagy (2012) on Egypt, Lincove (2012) on Uganda, Verdú et al.

requires a reduction in consumption of other goods, to support the acquisition of books, school material, school uniforms and other education related materials, but also payment of tuition when education is not free[48]. This makes the household income a key enabler of education demand[49]. The financial burden can, of course, be assisted by external assistance, reducing the contemporaneous investment[50].

The choice for education also requires a consideration of the use of time (which is substituting education for leisure, home care activities and labour). In particular, the need for an intra-household division of labour makes it important to understand the size and structure of the household[51], but also the traditional attribution of tasks, according to gender[52], age or even status in relation to other members (to be the first child, to be adopted into the family, a niece or nephew of the household head, etc.)[53]. Not only inside the household, but outside, the use of time in education raises opportunity costs, themselves correlated with the wage levels that could be earned contemporaneously (as opposed to those that can be earned in the future)[54]. In that sense, the level of education already achieved can have a dual effect, either as an enabler of progression, as it marks investment already done, or as a boundary above which the household's preferences switch to contemporaneous earnings. As the dimension of investment prevails throughout the decision-making process, access to credit and credit constraints are also important factors[55]. Finally, a key dimension of the investment nature of demand for

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(2013) on higher education in Colombia, Benhassine et al. (2013) on Morocco, Bader (2014) on higher education in Jordan and Attanasio and Kaufmann (2014) on higher education in Mexico.

[48] The significance of these costs is highlighted is studies like Ohba (2011) or Albert and David (2012).

[49] The same was found by studies such as Chow and Shen (2006), Kingdon and Theopold (2008), Qian and Smyth (2011) and Albert and David (2012)

[50] This effect is suggested in studies such as Glewwe and Kassouf (2012) or Benhassine et al. (2013).

[51] As suggested by White and Masset (2003)

[52] Different effects of covariates of demand according to gender are studies, for instance, by Lincove (2012) on Nigeria, Deng et al. (2014) on China or Attanasio and Kaufmann (2014) on Mexico.

[53] These variables were highlighted in the qualitative interviews conducted in Timor-Leste.

[54] The importance of these opportunity costs is highlighted by Weir (2011),

[55] The same is suggested is studies such as Masset (2010)

education is also the perceived quality of schools and teaching. Glewwe (2002) highlights this, inferring the significance of school quality as a determinant of households' choices[56].

Among these drivers of demand, some may have been affected by conflict themselves. A first effect can be found on returns to education. Chamarbagwala and Morán (2011) suggest that conflict may induce decreased expectations of returns to education. In Chapter 1, evidence is found that the experience of conflict did, in fact, affect post-conflict returns to education in Timor-Leste. Violence experienced during the school life of individuals, namely killings, is found to induce lower returns to education. The experience of extreme levels of violence, namely hunger, the disruption of livelihoods and of access to education derived from these may, on the other hand, seem to create a scarcity of human resources, making them more expensive. This happens while their productivity has been lowered due to the first channel. Overall, that study finds evidence of the negative impact on productivity to override the human capital scarcity effect, inducing, therefore lower post-conflict returns to education. These effects are induced by education decisions that occurred during the conflict and the post-conflict economic setting. If post-conflict demand for primary education is shown to react to expected returns to education, this may be evidence of an indirect effect of conflict.

Another indirect effect can be found through the household's income, if it proves, as theoretically expected, to be a significant driver of demand for education. Justino and Verwimp (2006) estimated that 20% of the Rwandan population moved into poverty, as a consequence of the genocide. Income reductions may have happened directly or via the destruction of productive assets or crops as found by Verwimp et al. (2010) or

[56] Other recent studies referring the significance of perceived quality of education and of access to schools are Lloyd et al. (2009) or Albert and David (2012).

Bundervoet (2007). The destruction of assets, Ibáñez and Moya (2009) highlight, reduces the income generating capacity of households and this may force them, in extreme cases, into a low yielding livelihood strategy and into a poverty trap. This means, as Akbulut-Yuksel (2009) also points out, that asset destruction immediately reduces the household income, reducing, therefore, the scope of non-income generating activities that members of the household may engage in, including education. This was observed by Shemyakina (2011) who found a strong negative association between female enrolment in education and past damage to the household dwelling. These impacts on the household's income generating capacities may have still persisted in the medium-run. While Badiuzzaman et al. (2011) allude to a "Phoenix" factor, a rapid economic recovery after extended conflicts, Cerra and Saxena (2008) point to a partial rebound after civil war, a recovery of half the loss in four years while the remainder takes more than a decade to recover. Although there is no empirical evidence regarding Timor, it would be reasonable to assume that this was also the case there where full economic potential was not yet reached in 2004/05, five years after the end of conflict. The assumption in this study is that, in 2004/05, the average Timorese household, and especially those more affected by the conflict, were still experiencing a lower income than they would otherwise have had, if the conflict had not occurred.[57]

Finally, another key dimension through which conflict may indirectly affect demand for education comes through the quality of education and, in the case of primary education, the perception of it by parents. Studies such as Lai and Thyne (2007) and Ichino and Winter-Ebmer (2004) look at impacts such as schools destroyed, access disrupted, migration or targeting of teachers. By affecting the quality of schools and imposing a scarcity of teachers, conflict affects the quality of education provided. Swee (2009)

[57] This is, of course, an assumption that recommends itself to be tested in future research.

found that, in Bosnia, the destruction of school buildings and educational facilities but also the migration of teachers resulted in reduced access to education, increasing its cost to the household, but also reducing its efficacy. Without any particular correlation with the intensity of violence, Timor experienced a significant reduction in the quality of schooling as a direct consequence of its independence, with the repatriation of nearly two thirds of the teaching body back to Indonesia[58]. The introduction of the Portuguese language in teaching, after 25 years of being outlawed - and when it has never been prevalent, even during the 500 years of colonization by the European nation - has placed a pressure on the quality of education that was still persistent in 2012, at the time fieldwork was conducted. This happened at the same time as many schools were being constructed, as depicted in Figure 10 above. It is therefore, a reasonable assumption that also in Timor the experience of conflict induced a reduction in school quality. If households were to appear, empirically, sensitive to perceptions of school quality when deciding on their children's attendance of primary school, then this could be construed as a channel of an indirect effect of conflict.

These three dimensions, returns to education, household income and (perceived and actual) quality of education may also be seen as channels of indirect medium-run effects of conflict. Taken together with other drivers of demand discussed here, and with the direct effects of conflict, these dimensions can further an understanding of the demand for primary education in a post-conflict setting such as Timor was in 2004/05.

[58] This number was independently stated by two key informants, one working with the Timorese Ministry of Education and the other a former official of this Ministry, interviewed in 2012. According to Ministry of Education (2011:33-34), in 1996 only 65 of all the teachers in the third level of basic education who were Timorese stayed after 1999 to provide for the education of what were then 21.810 students.

Building on this discussion, the following section presents the empirical strategy used to seek to assess medium-run impacts of conflict on post-conflict demand for primary education.

3- Empirical Strategy

Building on the previous discussion on the drivers of demand, this study seeks to empirically assess the possibility of identifying inferable medium-run impacts of conflict on the demand for primary education. It will undertake this by looking into the households' decision to have their children aged 6 to 14 years old attend primary school[59].

As this is a binomial choice, this study applies a Probit regression, as used in studies such as Justino et al. (2013), Deng et al. (2014) or Attanasio and Kaufmann (2014). Let, therefore, Y_1^* be a latent variable that linearly expresses the probability of attending school, i.e.,

$$Y_1^* = \alpha + Conf * \beta^c + X\beta + \varepsilon_1 \ (1)$$

As it is only possible to observe whether each child attends school or not, y_{1i}, it is assumed that:

$$y_{1i} = \begin{cases} 0 \ if \ y_1^* \leq 0 \\ 1 \ if \ y_1^* > 0 \end{cases}$$

with $Conf$ being the indicator of violence experienced during the conflict, X being the vector of all other variables theoretically established as determinants of the choice of attendance and $\varepsilon_1 \sim N(0, \sigma_1^2)$.

[59] Following Timorese law, marriage is only legal above the age of 14. As it is a decisive milestone, it is used to mark the end of the cohort of interest.

Seeking to assess the possible inference of impact of conflict on the demand for primary education, two alternative proxies of the violence experienced during the Timorese conflict are used: $Conf_1$ = *Average Killings during the life of the child*, expressing the continuum of violence the household witnessed in the district of birth of the child and during the conflict; $Conf_2$ = *Shock of extreme violence during the life of the child*, a binomial variable that indicates whether extreme levels of violence manifested themselves, at the district of the child's birth and during her lifetime. The attribution to each child of the experience of an extreme shock follows the procedure applied by Justino et al. (2013). The attribution is made if, in any year of her life, the level of killings and disappearances in her district of birth exceeded the mean for all years and districts by two standard deviations or more. In their study, as in Chapter 1, a count of the number of years when such a threshold is passed is undertaken. In this study, as can be perceived in Figure 9 and Table 15 above, during the life of children aged between 6 and 14 years old in 2004, and therefore born between 1990 and 1998, only one event of extreme violence (the 1999 post-referendum brutal backlash by the Indonesian military and affiliate militias) had occurred.

For each of these conflict indicators, the test of possible direct medium-run effects is conducted by, in a stepwise process, introducing further structure to the vector of covariates of attendance, X.

In a first regression, let $X = [X_1]$, expressing a set of individual, household and local specific covariates that, as discussed in section 2, may affect demand for primary education: *gender* (1 if female), *age*, *age*^{2}, binomial indicator that the child's household resides in an *urban* or rural area (1 if urban), binomial indicator that the child's *father*

attended school, binomial indicator that the child's *mother attended school*[60], binomial indicator that the child *migrated*, binomial indicator that the child is the *first child*, binomial indicator that the child *is adopted*, binomial indicator that the child is a *niece/nephew* of the household head, *ln (number of household members)* and the share of each of the following cohorts in the household: *boys aged 0-1, 2-4, 5-9, 10-14* and *men aged above 65*; girls aged *0-1, 2-4, 5-9, 10-14* and *women aged above 65*.

As referred to in section 2, the size and constitution of the household allows for a proxy of the intra-household division of labour, particularly with regards to what hours of care activities the child is involved in. Although the TLSLS (2007) provides information on reported hours of such work, its addition to the empirical model would impose on it endogenous effects. As discussed in section 2, the theory of education demand sets the choice of education to be concurrent with the choices of time use for work and care. While a possible empirical approach to such economic problems of the household would be a multinomial probability regression on the three alternative time uses, the nature of the empirical problem this study seeks to address, with the presence of many sources of endogeneity that recommend Instrumental Variable approaches to be tested, suggests that Probit and IV Probit regressions should be adopted. To account for the drivers of choice for care work, and in part also those for other work outside, the household's size and composition - not endogenous to school attendance - were therefore integrated into the empirical model.

In a second regression, let $X = [\,X_1 \quad X_2]$, where X_2 is a vector of covariates that express the nature of education as an investment: *completed years of education* (as an

[60] Preferably, this study would use information on the years of education of each of the parents. However, the TLSLS 2007 only reports data on education of 888 fathers of the 6,032 children aged between 6 and 14 (with an average of 1.4 years of education) and of 641 mothers (with an average of 1.16 years of education). It provides, however, a full indication of whether the parents attended school. Therefore, the study uses this as an indication of the level of parent's education.

indicator of human capital already accumulated by the child), *estimated returns to education* (calculated estimates of the model used in the analysis of post-conflict returns to education in Timor, in Chapter 1, with to same datasets used in this study), *average wage at the cluster level* (as an indicator of the opportunity cost of education), *number of cows* (as a proxy for credit worthiness, significant because in 2005 bancarization had not yet occurred in Timor and because cows were still a very important component of dowries in the country), *binomial variable on whether the household had been denied credit* (an indicator of access to credit).

The use of the average wage at the cluster level as an indicator of the opportunity costs of education follows the rationale presented before regarding the concurrent decision on use of time, in this case between education and work outside of the household. Again, the use of an indicator of occupation would introduce endogeneity into the empirical model.

The indicators of credit worthiness and access to credit seek to act as proxies for the potential cost of credit and credit constraints faced by the household, so as to address the inter-temporal optimization rational inherent to the decision on education.[61]

In a final, third regression, a full empirical model of demand is tried. Let, then $X = [\, X_1 \quad X_2 \quad X_3 \,]$, where X_3 is a vector of covariates that incorporate the dimensions of education as an economic good that is consumed: current *household per capita income*, *average private per capita expenditure in education at the cluster level*, *average distance to primary school at the cluster level* (as proxies of direct costs of education), *average external financing to education at the cluster level* (as a proxy of potential

[61] A calculated average rate of interest for credit received by the households at a cluster level was considered in an early empirical analysis. However, due to the low bancarization of the country, a significant proportion of the households and clusters did not report loans received or interest rates.

support for education available to the household) and percentage of school drop-outs attributed to *insufficient quality*, to *insufficient access* and to *insecurity* in the district of birth (as indicators of the perception of school quality). This latter regression will be used for further robustness tests and sample decomposition analysis.[62]

Lack of reliable information on income at the household level required the search for a proxy variable. A first possible solution would be to use household expenditure as a proxy. However household expenditure is endogenous in all resource generating time uses and, therefore, of substitute ones. There is, therefore a strong suspicion of endogeneity with the decision of attendance of primary school by the child. To overcome this limitation, an instrumental variable approach is adopted and tested. The *household per capita income*, proxied by the *per capita expenditure*, is therefore estimated using the remaining variables in the empirical model and the following instruments (as representative of productive assets and wealth): years of education of the household head, controls for type of dwelling owned (bamboo house, semi-permanent, traditional house, small house in compound of main house, permanent house, emergency/tent, other), area of owned plot, value of owned plot, area of plots partly owned, variables indicative of the number of units of livestock owned (buffalos, bali cows, horses, pigs, goats, sheep, chicken or ducks) and total value of the livestock. For each relevant regression, joint significance of the instruments is used to test for eventual weak instruments. In all of them, the instruments were found significant by the Sargan test. Endogeneity was also tested, following the procedure presented in Wooldridge (2010:587). As endogenity was found to exist, the estimate from the regression on instruments was used.

[62] A full description of the variables is in the appendix.

While the chosen covariates of the demand for primary education may be able to address perceived risks of endogeneity, there are reasonable expectations that the indicators of conflict may not. It may be the case that reverse causality does not occur between attendance to school, measured in 2004/05, and the conflict indicators, all reporting to the period 1975 to 1999. However, one cannot overlook reasonable expectations of omitted variable bias or correlated measurement error. In the conflict literature one can find evidence of endogeneity of conflict due to factors such as income and victimization of richer individuals and more educated individuals, as per Justino and Verwimp (2006). The empirical strategy adopted in this study, as it explores many covariates of demand for education, may possibly reduce the scope of omitted variables. To strengthen this possibility, all regressions also include district and ethno-linguistic control variables. It may, however, not encompass all possibilities. A possible omitted variable bias regarding both indicators of intensity of violence, *civilian killed during the life* of the individual and the binomial indicator of the experience of a *shock of extreme violence*, is the degree of socio-economic linkages between the populations in the districts of Timor and the neighbouring western half of the island, part of Indonesia. In these districts, it would be more likely for a higher proportion of the population to be sympathetic to a stronger integration of the two parts of the island. While a border was created in 1859 under a treaty between the then colonial powers of Portugal and Netherlands, Bowden and Hajek (2007) and Soares (2003) show that a commonality of language exists between different Timorese peoples across it, linking both sides. This commonality predates Indonesian occupation and may have promoted a higher allegiance to a project of integration among the peoples closer to the border. This may have propitiated for two characteristics to positively correlate: attendance of Indonesian education and formation of pro-Indonesia groups. The first effect, during the 25 years of

occupation could lead to relatively more educated parents and a higher preference for the education of their children during occupation. The second effect would lead to a higher likelihood of militia formation and higher levels of violence in the post-referendum events. Among these events was a massive displacement of Timorese to Indonesian West Timor, from which not all Timorese returned after independence. If those that stayed in West Timor were more committed to Indonesia (including being afraid of reprisals from violent acts perpetrated in 1999), they would also be more likely to have their children in school prior to the violent events that correlated with regime and sovereignty change in Timor. All other effects remaining unchanged, this would lead to a lowering in preferences to school in the post-conflict setting at a district level due to an unobserved shift in the prevalent characteristics of people residing in those districts. If that is the case then, without correction, there could be an over-estimation of negative impacts of conflict on the choice of having children attend primary school.

To address this possible source of time-variant endogeneity, an IV approach was applied, using the distance to the western border of Timor-Leste with Indonesia as an instrument. This instrument was explored by Justino et al. (2013, 2011). This strategy made use of the fact that the Indonesian operations' logistics were systematically supported through their western half of the island of Timor, where, namely a vast number of Timorese were forcefully displaced in the post 1999 referendum violence, as per CAVR (2005). This allowed for stronger control but also more violence to be enacted by Indonesia in the western districts of Timor-Leste. The forms of severe violence were also enabled by this logistical feature, again as reported in CAVR (2005), particularly in the case of the destruction enacted in the post-referendum period, which was stronger closer to the border, where pro-Indonesia militias received more support and were better armed. Therefore, and as it was described in historical reports, namely

Taylor (1990; 1999) and CAVR (2005), the distance to the border is expected to be correlated with the indicators of conflict used. Meanwhile, higher levels of attendance to primary education occur is districts that are either closer to the border, such as Bobonaro or Cova Lima, the capital Dili (more central) or the farther east districts of Baucau and Lautem[63]. Finally, it was noticed that the partial correlation statistic between attendance and distance to the border is very low and non-significant. These suggest that the *distance to the border* is a possible instrument.

The empirical model is, therefore, estimated using Probit and IV Probit regressions. As it is likely that more than one child of primary school age resided in the same household, the variance-covariance matrixes were clustered by household. As mentioned before, the regressions were run with district and ethno-linguistic controls.[64]

The next session will briefly present the data used in this analysis.

4- Data Description

This study uses the dataset of the Timor-Leste Survey of Living Standards of 2007 (TLSLS), conducted by the Timorese National Directorate of Statistics (DNE), with the support of the World Bank and UNICEF. A representative set of 4,470 households was interviewed, with 25,000 people surveyed, from all districts of Timor-Leste, of which 6,032 were aged between 6 and 14 years old.

The study uses a second dataset, the Human Rights Violations Database (CAVR, 2006), containing 11,315 observations of human rights abuses in order to generate the indicators of conflict. The observations were collected from narrative statements of deponents to the Timorese Truth and Reconciliation Commission (CAVR), qualitative reports from Amnesty International and data collected by the Timorese NGO

[63] This can be confirmed in Table 17.
[64] Empirical estimation is done using the STATA 13 SE software package.

FOKUPERS. Under the CAVR mandate, Benetech-HRDAG produced and presented calculations of human rights violations in Timor-Leste in support of the commission's final report entitled "Chega!"(CAVR, 2005).

Table 16: School attendance in 2004-05 per age (6 to 18 year olds) and gender (%)

Age	6	7	8	9	10	11	12	13	14	15	16	17	18
Female													
Prim.	6.6	25.8	49.7	72.4	81.4	80.3	81.8	73.4	59.4	47.2	32.6	15.8	15.4
Sec.	-	-	-	-	-	-	2.9	10.5	25.3	35.4	46.9	57.7	51.4
Male													
Prim.	8.0	24.0	49.4	71.6	76.8	83.3	81.4	78.6	68.6	51.3	44.6	24.2	20.9
Sec.	-	-	-	-	-	-	2.7	8.4	18.2	28.1	37.3	50.0	48.9
All													
Prim.	7.3	24.9	49.6	72.0	79.1	81.8	81.6	76.1	63.9	49.3	39.0	20.3	18.1
Sec.	-	-	-	-	-	-	2.8	9.4	21.8	31.7	41.7	53.6	50.2

Source: author's calculations using TLSLS (2007)

In Table 16, above, it is possible to notice some relevant characteristics of Timorese school attendance in the post-conflict school year of 2004/05. A first characteristic is the late entrance into school. A second noticeable characteristic is an indication that school attendance reaches relatively high values, close to 86%, around the ages of 12-14 years. This is an indication of a preference by the households to send their young members to school, but also of some barriers that may vary in importance with age. The statistics reveal a slow progression in education and suggest a high number of grade repetitions. The significant reduction in attendance, after its maximum values, suggests a relatively small schooling attainment amongst young Timorese. A final point should be noted in relation to the similitude in attendance rates between boys and girls. There is some indication of a slightly higher attendance rate of girls in earlier ages and of young boys at later ages but the differences are not statistically significant[65].

[65] A battery of t-tests on the difference of attendance for each age did not reject the null hypothesis of no difference in any of the cases.

Table 17: Primary school attendance in 2004-05 (age 6 to 14) by district and type of residence

Distrito	Rural	Urban	Total
Aileu	*46%*	.	*46%*
Ainaro	62%	61%	61%
Baucau	60%	58%	60%
Bobonaro	61%	58%	59%
Cova Lima	68%	67%	67%
Dili	77%	69%	70%
Ermera	*40%*	*55%*	*41%*
Lautem	64%	64%	64%
Liquica	*45%*	*54%*	*49%*
Manufahi	56%	55%	55%
Manatuto	64%	65%	64%
Oecussi	*38%*	*58%*	*47%*
Viqueque	60%	50%	56%
Total	53%	62%	57%

Source: author's calculations using TLSLS (2007)

A review of Table 17 reveals significant regional differences in primary school attendance. In some of the Timorese districts, Aileu, Ermera, Liquiçá and Oecussi, the school attendance was also significantly different, depending on the typology of residence[66].

[66] T-tests performed reject the hypothesis of equal average school attendance in rural and urban households of the districts mentioned.

Table 18: Primary school attendance in 2004-05 by ethno-linguistic group and gender (age 6 to 14)

Ethno-linguistic group	Male	Female	Total
Tetum	72%	68%	70%
Baequeno	45%	48%	46%
Bunak	67%	65%	66%
Fatalucu	63%	62%	63%
Galolen	64%	74%	70%
Kaklun bi	.	0%	0%
Kemak	46%	47%	46%
Laklei	53%	56%	54%
Macalero	77%	63%	70%
Macasae	63%	64%	63%
Mangilih	50%	0%	33%
Mambae	51%	50%	50%
Midiki	58%	67%	62%
Naueti	71%	79%	74%
Sa ani	67%	40%	56%
Tetum ter	54%	60%	57%
Tokodete	51%	43%	47%
Uaimua	45%	49%	47%
Bahasa In	71%	50%	62%
Portugues	50%	100%	67%
Inggris	100%	0%	50%
Other	59%	59%	59%
Total	58%	57%	57%

Source: author's calculations using TLSLS (2007)

A review of Table 18, above, reveals some significant differences in primary school attendance between ethno-linguistic groups. It is important to notice that most of these differences correlate with the geographic diversity shown is the previous table, as most ethno-linguistic groups reside in one district alone. Despite some distinct differences in average school attendance according to gender and ethno-linguistic group they are not statistically significant.

An analysis of the indicators of conflict used, in Table 19 below, shows that there is not much heterogeneity attributable to gender differences and type of residence. On average, a household witnessed close to 7 killings or disappearances per year, during the life of their primary school aged children and while the conflict was occurring. Close to 30 percent of the children in the sample lived through the events of extreme violence in 1999.

Table 19: Conflict indicators by gender and type of residence

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2947	N=3085	N=2793	N=3239	N=6032
Conflict 1: Average killings during life	6.4 (6.7)	6.7 (7.0)	6.2 (6.4)	6.9 (7.2)	6.5 (6.8)
Conflict 2: Shock of extreme violence during life	27% (44.2%)	28% (45.0%)	21% (40.8%)	33% (47.0%)	27% (44.6%)

Source: author's calculations using TLSLS (2007)

As would be expected, and can be seen in Table 20, school attendance is higher in urban areas. Other noticeable differences are in the prevalence of migrants and, to a lesser extent, the percentage of children residing in households headed by an aunt or uncle. On the other hand, no significant differences are noticeable between girls and boys.

Table 20: School attendance, individual, household and local level indicators

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2947	N=3085	N=2793	N=3239	N=6032
Attending School in 2004/05	57.1% (49.5%)	57.6% (49.4%)	61.8% (48.6%)	53.4% (49.9%)	57.3% (49.5%)
Female	- -	- -	48.9% (50.0%)	48.8% (50.0%)	48.9% (50.0%)
Urban	46% (50%)	46% (50%)	- -	- -	46% (50%)
Age	10 (3)	10 (3)	10 (3)	10 (3)	10 (3)
Father Attended School	2.6% (16.1%)	2.8% (16.4%)	4.0% (19.6%)	1.6% (12.5%)	2.7% (16.2%)
Mother Attended School	1.6% (12.7%)	1.3% (11.5%)	2.0% (14.1%)	1.0% (9.9%)	1.5% (12.1%)
Migrated	3.1% (17.2%)	3.5% (18.5%)	5.5% (22.8%)	1.4% (11.7%)	3.3% (17.9%)
First child	22.8% (42.0%)	20.9% (40.6%)	21.1% (40.8%)	22.4% (41.7%)	21.8% (41.3%)
Adopted	1.4% (11.6%)	1.7% (12.9%)	1.4% (11.9%)	1.6% (12.6%)	1.5% (12.3%)
Niece/Nephew	3.0% (17.0%)	3.2% (17.7%)	3.9% (19.5%)	2.4% (15.3%)	3.1% (17.4%)
Household Size	7.3 (2.3)	7.2 (2.3)	7.5 (2.4)	7.0 (2.2)	7.2 (2.3)

Source: author's calculations using TLSLS (2007)

An analysis of the indicators of education as an investment, in Table 21, shows that, on average, Timorese children aged between 6 and 14 had completed only the first grade. Expected returns to education are significantly low, but so are the opportunity costs. The households own close to one cow and only very few had a loan denied. It is also

noticeable that there is a relative homogeneity between girls and boys and between urban and rural dwellers, while the heterogeneity within each group is more significant.

Table 21: Indicators of education as an investment

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2947	N=3085	N=2793	N=3239	N=6032
Completed Years of Education	1 (2)	1 (2)	2 (2)	1 (2)	1 (2)
E(Returns to Education)	1.29% (0.6%)	1.30% (0.6%)	1.29% (0.6%)	1.30% (0.6%)	1.30% (0.6%)
Average local hourly wage	0.05 (0.17)	0.05 (0.17)	0.09 (0.21)	0.02 (0.12)	0.05 (0.17)
Number of cows owned	0.9 (3.7)	0.8 (2.1)	0.8 (3.0)	0.9 (3.0)	0.9 (3.0)
Household had loan denied	2% (14%)	2% (16%)	2% (15%)	2% (14%)	2% (15%)

Source: author's calculations using TLSLS (2007)

The analysis of Table 22, below, reveals again some heterogeneity between urban and rural areas. Urban households have, on average, higher income; face higher education costs; have access to more external financial support; and their children take less time to reach school.

Table 22: Indicators of education as a consumption good

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2947	N=3085	N=2793	N=3239	N=6032
Per capita Monthly Household Income	22.9 (13.5)	22.7 (12.8)	26.8 (15.4)	19.4 (9.6)	22.8 (13.1)
Average local education costs (monthly)	26.0 (18.0)	25.3 (16.7)	32.3 (20.5)	20.0 (11.3)	25.7 (17.4)
Average local subsidies to education	1.7 (4.4)	1.5 (3.7)	2.3 (4.6)	1.0 (3.5)	1.6 (4.1)
Average local time to primary school (in minutes)	28.8 (17.6)	28.6 (16.8)	23.0 (11.9)	33.6 (19.3)	28.7 (17.2)
Insufficient Quality	2.1% (2.2%)	2.2% (2.3%)	1.6% (1.4%)	2.7% (2.6%)	2.2% (2.2%)
Insufficient Access	6.5% (3.7%)	6.5% (3.7%)	5.2% (3.0%)	7.6% (4.0%)	6.5% (3.7%)
Insufficient Security	0.8% (1.3%)	0.9% (1.4%)	0.6% (0.9%)	1.0% (1.6%)	0.8% (1.4%)

Source: author's calculations using TLSLS (2007)

Significantly, perceptions of school quality are also better for urban dwellers. On the other hand, no significant differences are noticeable between girls and boys.

As a first approximation in the analysis of medium-run impacts of conflict on school attendance, in Table 23 below, it is possible to compare the average probability of attendance and the average values of the covariates described in section 3, depending on whether the household experienced the shock of extreme violence or not.

Table 23: Descriptive statistics on the experience of extreme conflict

	Experienced Extreme Violence		All
	Yes	No	
Variable	1653	4379	6032
Attending School in 2004/05	64.5% (47.9%)	54.6% (49.8%)	57.3% (49.5%)
Female	47% (49.9%)	49% (50.0%)	49% (50.0%)
Urban	36% (47.9%)	50% (50.0%)	46% (49.9%)
Age	11 (2)	9 (3)	10 (3)
Father Attended School	2.8% (16.5%)	2.7% (16.1%)	2.7% (16.2%)
Mother Attended School	1.5% (12.2%)	1.5% (12.0%)	1.5% (12.1%)
Migrated	3.0% (17.1%)	3.4% (18.1%)	3.3% (17.9%)
First child	25.5% (43.6%)	20.4% (40.3%)	21.8% (41.3%)
Adopted	1.6% (12.7%)	1.5% (12.1%)	1.5% (12.3%)
Niece/Nephew	4.5% (20.7%)	2.6% (15.9%)	3.1% (17.4%)
Household Size	6.9 (2.2)	7.4 (2.3)	7.2 (2.3)
Completed Years of Education	1 2	1 2	1 2
E(Returns to Education)	1.12% (1.05%)	1.36% (0.22%)	1.30% (0.59%)
Average Local hourly wage	0.07 (0.3)	0.05 (0.1)	0.05 (0.2)
Number of cows owned	1.3 (2.9)	0.7 (3.0)	0.9 (3.0)
Household had loan denied	1% (11.2%)	3% (15.9%)	2% (14.7%)
Per capita Monthly Household Income	23.3 (12.9)	22.6 (13.2)	22.8 (13.1)
Average local education costs (monthly)	21.9 (12.7)	27.1 (18.6)	25.7 (17.4)
Average local subsidies to education (monthly)	0.8 (1.6)	1.9 (4.6)	1.6 (4.1)
Average local time to primary school (in minutes)	33.5 (19.9)	26.9 (15.6)	28.7 (17.2)
Insufficient Quality	1.9% (1.1%)	2.3% (2.5%)	2.2% (2.2%)
Insufficient Access	8.3% (3.6%)	5.8% (3.6%)	6.5% (3.7%)
Insufficient Security	1.4% (2.1%)	0.6% (0.9%)	0.8% (1.4%)
Conflict 1: Average killings during life	16.4 (4.9)	2.8 (2.3)	6.5 (6.8)

Source: author's calculations using TLSLS (2007)

There is some indication, although not statistically significant, that those children that experienced extreme levels of violence are more likely to have attended primary school in 2004/05. Other differences found here are in the location of the households. There is a higher likelihood: that rural households would be among those that suffered from the experience of extreme violence in 1999; that the child would be living with uncles of aunts (suggesting the possibility of being orphans); that there would be reports of insufficient access to schools; and, as expected, that households would have experienced a higher average number of killings during their lifetime.

The brief analysis of the variables in this study suggests a relative homogeneity between boys and girls and between urban and rural areas, while there are significant standard deviations within each group. This suggests it would be of interest to analyse demand for primary education also for the sub-samples of boys and girls and urban and rural dwellers. It also reveals the need to account for district and ethno-linguistic fixed effects. Some indication exists of a higher preference for education of those that experienced higher levels of violence during the conflict, as was also suggested by the qualitative references.

In the next section, these suggestions will be tested.

5- Results

As described before, this study seeks to find possible inferences of medium-run impacts of conflict on households' demand for primary education. It will do this by looking at each of the analyses of two manifestations of the Timorese independence conflict, namely, the experience of a continuum of violence while the conflict overlapped with the life of the child and the experience of the brutal shock of violence that occurred after the 1999 referendum. The analysis will also make use of the covariates of demand for

education, following theoretical and empirical evidence found in other settings, so as to better understand post-conflict demand for primary education and highlight the possible indirect effects of conflict, through the channels discussed in section 2 above. It will, finally, seek to build a possible synthesis of inferable effects.

5.1 Continuum of violence witnessed by the household during the life of the child

The possible medium-run impacts of a continuum of violence experienced during the last years of the Timorese conflict, when it overlapped with the lives of the children of primary school age in 2004/05, focuses - as noted above - on the impacts of heterogeneous levels of average number of people reported to have been killed or disappeared in each children's district of birth during their live time.

The Instrumental Variables (IV) approach, suggested in the section 3, using distance to the border as an instrument, found empirical evidence of the instrument to be a significant and strong regressor, as per the Sargan test (presented in Table 51). The exclusion restriction test rejected the null of exogeneity, following the procedure presented in Wooldridge (2010:587). As proposed in section 3, this test was performed against the backdrop of an empirical reduced form model of demand for primary education that sought to account for the heterogeneity in individual, household and local characteristics; drivers of education as an investment; consumption constraints; restrictions of access to school; and perceptions of school quality and constraints to its efficacy. It also accounted for district level and ethno-linguistic fixed effects, trying to control for specific unobservable time-invariant characteristics that may, therefore, have manifested themselves both during the duration of the conflict in Timor and, already in a post-conflict stage, in 2004/05. It is, therefore, plausible to infer that, even though no longer mechanisms of reverse causality are taking place, there are still sources of omitted variable bias that, as hypothesised in section 3 above, may lead to an over-

estimation of negative impacts of conflict on demand for education. This would suggest a higher prevalence of trauma than may be the case or it may point to an under-estimation of positive impacts, i.e., suggesting lower prevalence of resilience. The results, presented in Table 24, below, suggest that this may be the case.

Table 24: Primary Education Demand - Standard Models with Conflict 1: Average killings during life of the child

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Constant	-12.231***	1.557	-12.577***	30.423***	-12.505***	-4.831
	(0.556)	(4.684)	(0.564)	(9.517)	(0.768)	(2.951)
Conflict 1: Average killings during life	**-0.019*** **	**0.338*** **	**-0.021*** **	**1.079*** **	**-0.023*** **	**0.166** **
	(0.007)	(0.121)	(0.007)	(0.244)	(0.007)	(0.071)
Female	-0.132**	-0.137**	-0.138**	-0.147**	-0.117*	-0.120**
	(0.059)	(0.059)	(0.060)	(0.059)	(0.060)	(0.060)
Age	2.311***	-0.526	2.437***	-6.588***	2.514***	0.950
	(0.104)	(0.965)	(0.112)	(2.001)	(0.113)	(0.595)
Age^2	-0.102***	0.026	-0.108***	0.300***	-0.111***	-0.040
	(0.005)	(0.044)	(0.005)	(0.090)	(0.005)	(0.027)
Urban	-0.053	-0.021	-0.040	0.023	-0.558***	-0.524***
	(0.065)	(0.067)	(0.066)	(0.068)	(0.093)	(0.095)
Father Attended School	0.042	0.004	0.058	-0.075	-0.102	-0.112
	(0.183)	(0.183)	(0.185)	(0.184)	(0.175)	(0.174)
Mother Attended School	0.276	0.427*	0.288	0.717***	0.117	0.209
	(0.253)	(0.254)	(0.244)	(0.256)	(0.222)	(0.224)
Migrated	-0.049	-0.509**	-0.086	-1.505***	-0.237*	-0.460***
	(0.150)	(0.211)	(0.139)	(0.343)	(0.139)	(0.148)
First Child	0.046	0.077	0.050	0.106	0.011	0.025
	(0.070)	(0.070)	(0.070)	(0.071)	(0.071)	(0.071)
Adopted	-0.105	0.045	-0.081	0.354	-0.107	-0.029
	(0.245)	(0.242)	(0.242)	(0.246)	(0.229)	(0.228)
Niece/Nephew	0.191	0.152	0.171	0.012	0.090	0.070
	(0.143)	(0.141)	(0.137)	(0.143)	(0.140)	(0.140)
Ln (Household Size)	0.084	0.092	0.051	0.056	0.470***	0.433***
	(0.089)	(0.088)	(0.087)	(0.087)	(0.112)	(0.113)
Share of boys 0-1	0.372	0.585	0.424	1.264**	1.223**	1.296**
	(0.531)	(0.543)	(0.531)	(0.572)	(0.541)	(0.543)
Share of boys 2-4	0.813**	0.668*	0.970**	0.494	1.600***	1.456***
	(0.387)	(0.392)	(0.384)	(0.400)	(0.387)	(0.391)
Share of boys 5-9	0.230	-0.400	0.302	-1.694***	0.594*	0.223
	(0.298)	(0.362)	(0.300)	(0.508)	(0.317)	(0.341)
Share of boys 10-14	-0.316	-0.136	-0.213	0.302	0.240	0.299
	(0.307)	(0.315)	(0.304)	(0.340)	(0.316)	(0.316)
Share of men above 65	-0.682	-1.073	-0.663	-1.818**	-0.136	-0.385
	(0.682)	(0.705)	(0.675)	(0.733)	(0.686)	(0.700)
Share of girls 0-1	0.189	-0.598	0.283	-1.990***	0.947*	0.518
	(0.540)	(0.605)	(0.538)	(0.727)	(0.558)	(0.592)
Share of girls 2-4	0.322	0.465	0.390	0.957**	0.623	0.692*
	(0.408)	(0.421)	(0.403)	(0.429)	(0.412)	(0.413)
Share of girls 5-9	0.843***	0.400	0.839***	-0.600	1.127***	0.848***
	(0.304)	(0.341)	(0.302)	(0.441)	(0.306)	(0.329)
Share of girls 10-14	-0.193	-0.080	-0.124	0.096	0.017	0.049
	(0.308)	(0.312)	(0.305)	(0.315)	(0.311)	(0.310)
Share of women above 65	0.663	0.244	0.685	-0.567	0.604	0.394
	(0.665)	(0.673)	(0.639)	(0.695)	(0.625)	(0.629)
Completed Years of Education			-0.006	0.096***	-0.062**	-0.041
			(0.023)	(0.033)	(0.024)	(0.027)
E(Returns to Education)			-15.099**	40.942***	-18.000***	-8.423
			(6.866)	(14.215)	(6.692)	(7.683)
Average local wage			0.118	0.179	-0.186	-0.141
			(0.162)	(0.159)	(0.160)	(0.165)
Number of cows owned			0.060***	0.057***	0.037***	0.040***
			(0.013)	(0.013)	(0.013)	(0.013)

Primary Education Demand - Standard Models with Conflict 1: Average killings during life of the child (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Household had a loan			-0.517***	-0.432***	-0.268*	-0.276*
denied			(0.161)	(0.158)	(0.161)	(0.160)
E (Per capita Monthly					0.055***	0.050***
Household Income)					(0.009)	(0.009)
Average local education					-0.006**	-0.006**
costs					(0.003)	(0.003)
Average local subsidies					0.001	0.001
to education					(0.007)	(0.007)
Average time to primary					-0.003	-0.002
school					(0.002)	(0.002)
Insufficient Access					-6.601***	-6.626***
					(1.514)	(1.531)
Insufficient Quality					-36.367***	-37.767***
					(8.675)	(8.726)
Insufficient Security					-11.444	-12.948
					(11.184)	(11.298)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6031	6022	6031	6022	6022	6022
Pseudo R^2	0.2846	0.2879	0.2952	0.2987	0.3085	0.3069
Log-Likelihood	-125766.170	-125043.323	-123889.822	-123148.361	-121425.639	-121698.394

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

They make this case, however, with a puzzling sign reversion, from a negative coefficient for the impact of conflict in the Probit regressions (columns 1, 3 and 5), to a positive coefficient in the IV Probit regressions (columns 2, 4 and 6). Notably, while the absolute values of the IV Probit estimates are much higher, the estimated standard deviations are also much higher, suggesting lower efficiency. While adding into the empirical model further significant correlates of attendance in primary education (from models in column 1-2 to 5-6) the signs of the coefficients of this indicator of conflict remain stable and unaltered. This suggests the need for care in the inference of effects of conflict, using this indicator, and the need of further testing.

Before progressing with this line of analysis, there are reasons to analyse the covariates of demand for primary education in post-conflict Timor-Leste that were used, in order to validate their inclusion in the empirical testing but also because they provide important insights. These can be seen in Table 24, above, and Table 25, below. On average, and keeping all other variables constant, a girl seemed to be less likely to

attend primary school in Timor in 2004/05. The likelihood of attendance of an urban child also seemed to be lower than that of an otherwise similar rural child. The negative sign should not suggest, directly, an urban disadvantage, as our discussion on the data revealed that those living in urban spaces benefited, on average, from a set of conditions that are also suggested as significant and conducive to higher primary school attendance[67]. Children that migrated seemed less likely to attend primary school, while those living in larger households - particularly if they had younger children or children their own age and, probably, also, had younger parents - were more likely to have attended school in 2004/05.

Table 25: Primary Education Demand - Standard Models with Conflict - Marginal Effects - Conflict 1: Average killings during life of the child

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Conflict 1: Average killings during life	**-0.005*** (0.002)**	**0.092*** (0.033)**	**-0.006*** (0.002)**	**0.290*** (0.065)**	**-0.006*** (0.002)**	**0.044** (0.019)**
Female	-0.036** (0.016)	-0.038** (0.016)	-0.037** (0.016)	-0.039** (0.016)	-0.031* (0.016)	-0.032** (0.016)
Age	0.633*** (0.024)	-0.144 (0.263)	0.658*** (0.026)	-1.772*** (0.534)	0.666*** (0.025)	0.252 (0.158)
Age^2	-0.028*** (0.001)	0.007 (0.012)	-0.029*** (0.001)	0.081*** (0.024)	-0.029*** (0.001)	-0.011 (0.007)
Urban	-0.015 (0.018)	-0.006 (0.018)	-0.011 (0.018)	0.006 (0.018)	-0.148*** (0.024)	-0.139*** (0.025)
Father Attended School	0.012 (0.050)	0.001 (0.050)	0.016 (0.050)	-0.020 (0.050)	-0.027 (0.046)	-0.030 (0.046)
Mother Attended School	0.076 (0.069)	0.117* (0.069)	0.078 (0.066)	0.193*** (0.069)	0.031 (0.059)	0.056 (0.060)
Migrated	-0.013 (0.041)	-0.139** (0.057)	-0.023 (0.038)	-0.405*** (0.091)	-0.063* (0.037)	-0.122*** (0.039)
First Child	0.013 (0.019)	0.021 (0.019)	0.013 (0.019)	0.028 (0.019)	0.003 (0.019)	0.007 (0.019)
Adopted	-0.029 (0.067)	0.012 (0.066)	-0.022 (0.065)	0.095 (0.066)	-0.028 (0.061)	-0.008 (0.060)
Niece/Nephew	0.052 (0.039)	0.042 (0.039)	0.046 (0.037)	0.003 (0.038)	0.024 (0.037)	0.019 (0.037)
Ln (Household Size)	0.023 (0.024)	0.025 (0.024)	0.014 (0.024)	0.015 (0.023)	0.124*** (0.029)	0.115*** (0.030)
Share of boys 0-1	0.102 (0.145)	0.160 (0.148)	0.114 (0.143)	0.340** (0.153)	0.324** (0.143)	0.344** (0.144)
Share of boys 2-4	0.223** (0.106)	0.183* (0.107)	0.262** (0.103)	0.133 (0.108)	0.423*** (0.102)	0.387*** (0.104)
Share of boys 5-9	0.063 (0.082)	-0.109 (0.099)	0.082 (0.081)	-0.455*** (0.136)	0.157* (0.084)	0.059 (0.091)
Share of boys 10-14	-0.087 (0.084)	-0.037 (0.086)	-0.057 (0.082)	0.081 (0.091)	0.063 (0.084)	0.079 (0.084)

[67] It is relevant to notice, however, that an average urban child that was only to have access to the socio-economic conditions of an average rural child, would probably face a harsher environment in an urban setting and be less likely to attend primary school.

Table 25: Primary Education Demand - Standard Models with Conflict - Marginal Effects - Conflict 1: Average killings during life of the child (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Share of men above 65	-0.187	-0.293	-0.179	-0.489**	-0.036	-0.102
	(0.187)	(0.193)	(0.182)	(0.197)	(0.182)	(0.186)
Share of girls 0-1	0.052	-0.163	0.076	-0.535***	0.251*	0.138
	(0.148)	(0.165)	(0.145)	(0.195)	(0.148)	(0.157)
Share of girls 2-4	0.088	0.127	0.105	0.257**	0.165	0.184*
	(0.112)	(0.115)	(0.109)	(0.115)	(0.109)	(0.109)
Share of girls 5-9	0.231***	0.109	0.226***	-0.161	0.298***	0.225***
	(0.083)	(0.093)	(0.081)	(0.118)	(0.081)	(0.087)
Share of girls 10-14	-0.053	-0.022	-0.033	0.026	0.005	0.013
	(0.085)	(0.085)	(0.082)	(0.085)	(0.082)	(0.082)
Share of women above 65	0.182	0.067	0.185	-0.152	0.160	0.105
	(0.182)	(0.184)	(0.172)	(0.187)	(0.165)	(0.167)
Completed Years of Education			-0.002	0.026***	-0.016**	-0.011
			(0.006)	(0.009)	(0.006)	(0.007)
E(Returns to Education)			-4.076**	11.009***	-4.764***	-2.236
			(1.848)	(3.803)	(1.764)	(2.038)
Average local wage			0.032	0.048	-0.049	-0.037
			(0.044)	(0.043)	(0.042)	(0.044)
Number of cows owned			0.016***	0.015***	0.010***	0.011***
			(0.003)	(0.003)	(0.003)	(0.003)
Household had a loan denied			-0.140***	-0.116***	-0.071*	-0.073*
			(0.043)	(0.043)	(0.043)	(0.043)
E (Per capita Monthly Household Income)					0.015***	0.013***
					(0.002)	(0.002)
Average local education costs					-0.002**	-0.002**
					(0.001)	(0.001)
Average local subsidies to education					0.000	0.000
					(0.002)	(0.002)
Average time to primary school					-0.001	-0.001
					(0.001)	(0.001)
Insufficient Access					-1.747***	-1.759***
					(0.400)	(0.406)
Insufficient Quality					-9.625***	-10.025***
					(2.289)	(2.309)
Insufficient Security					-3.029	-3.437
					(2.957)	(2.995)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6031	6022	6031	6022	6022	6022

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Income appears to hold, as would be theoretically expected, in affecting demand for primary education. As per marginal effects calculated and presented, in Table 25 above, a child from a household earning a monthly income one standard deviation above another otherwise equivalent child, $13.1, would be, on average, 17% to 20% more likely to have attended primary education in the year of analysis. This is particularly relevant because, as discussed above, there is evidence that in other post-conflict settings - and in the medium run - households may still not have fully recovered from reductions in their income generating capacity caused by conflict. If that is the case, the

experience of conflict is still having, through this channel, a negative medium-run legacy on demand for education.

Direct costs seem also to hold as significant and with the expected sign. In what could also be expected, opportunity costs in the form of expected work wages do not appear to be significant.

Finally, perceptions of difficulties of access and poor quality are shown to have been significant deterrents to primary school attendance. Again, and as discussed in section 2, this is another potential indirect channel of medium-run impacts of conflict. If the effects of conflict in the reduction of school and teaching quality were not fully recovered, as may be the case in Timor-Leste, then there is significant evidence that the poorer quality retracts demand for primary education.

A comment can also be made on some indication of credit constraints deterring demand for education. On one hand, in Table 24 and Table 25, one seems to find no clear significant evidence of education at the primary level being perceived as an investment. The coefficient of expected returns to education is negative in the estimation of the complete empirical model for demand, in columns 5 and 6 of both tables, and non-significant in the IV Probit estimation[68]. In both cases, the estimated marginal effects, presented in Table 25 are small. A child for whom the expected returns to education were to be above in one standard deviation, namely 0.6%, to what another otherwise equivalent child could expect, would be, on average, 1% to 3% less likely to attend primary education, bearing in mind that the last estimate is not statistically significant. A similar result, of an estimated negative sign of the effect of estimated returns to education on demand was also found in Kingdon and Theopold (2008) and attributed to

[68] Notably, this result comes in contradiction to the one found in the analysis of demand for secondary school in Chapter 3.

liquidity constraints. In their study, the suggestion was that, in the face of liquidity constraints, a higher return to education can become a signal not of future earnings but of immediate current earnings for whatever level of education (above zero) has already been attained. Liquidity constraints and other reasons for households' heightened preferences for the present (high risk aversion or reduced foresight) could, in theory and as found by Kingdon and Theopold (2008), reverse the otherwise expected relation between returns to education and demand. In another study, Nakajima and Nakamura (2012) find in Japan that increased returns to primary education can have dual results. If lower returns on primary education may mean that poorer parents, less educated, have lower capacity to invest in the furthering of their children's education, a high return can signal an opportunity cost in progressing to post-primary education and an incentive to end education sooner. The hypothesis suggested in their studies presents a possible path for further investigation and is reinforced if one considers the coefficients of the indicators of credit worthiness (number of cows owned) and credit constraints (having a loan denied by the household), which are both significant and with the theoretically expected signs. An understanding of the estimates found for the coefficient of expected returns to education may also come from the insights of Dominitz and Manski (1994), Manski (2004, 1993) and Manski and Wise (1983). As the distance to the formal labour market that generated the estimates of the expected returns to education, as per Chapter 1, is significant among primary school aged children, the likelihood of the estimates to be accurate indicators of real returns to primary school education (and, more so, that parents are aware of those returns) is less likely. This appears to be reinforced by the estimates of the coefficient of expected returns to education in relation to the demand for secondary education in Chapter 3, which signalled the expected positive correlation. If so, there is also a possibility of a spurious correlation that, at the moment, cannot be

ruled out. A pathway to overcome this would be to require the elicitation of households' expectations of returns to education, as recommended by Charles Manski.

Linked with this distance from the labour market comes a final factor that should be considered. As Lewin (2005) and Kingdon and Theopold (2008) suggest, there is a further link mediating primary education and the labour market. This is also suggested in the study of post-conflict returns to education in Timor-Leste (Chapter 1) that finds the average level of education of a waged worker in Timor in 2007 to be 11 years, i.e. almost full completion of secondary school. This means that the access to formal employment for anyone currently attending primary school is very likely to be mediated by the attendance of secondary school. That being the case, the likelihood of attending secondary school and the expected returns to secondary education would also be factors under consideration by households. All these paths for future research should be considered to fully disentangle this unexpected result.

An analysis of the marginal effects of the conflict indicator in Table 25 may assist in shedding some light on the puzzling reversal of sign from one estimation approach to the other. A direct reading of the coefficient suggests that the IV Probit approach indicates a relatively higher positive marginal effect of conflict. According to these estimates, a child that witnessed in her life a level of killings above in one standard deviation, 6.8 more killings per year, than another otherwise equivalent child, would be, on average, 30% more likely to attend primary education, if the IV Probit regression were to hold. Meanwhile she would be 3% less likely, if endogeneity was not present and the Probit regression were to provide unbiased estimates. The low estimate under the Probit estimation - together with the suggestion of over-estimation of negative impacts - suggests that sign reversion is not totally implausible. However, a suggestion of caution comes from noticing that, once again, the estimated IV Probit standard

deviations are also much higher, suggesting, again, lower efficiency. These indications leave, therefore, a suggestion of cautious analysis and the need for further testing of the robustness of the results.

A robustness analysis is suggested by the indicated lateness of entry into primary school, as reported in Table 16. Table 52, in the appendix, shows the estimates of medium run effects of conflict considering different age cohorts to account for later entry. When the age of entrance is assumed to be 7, the Probit estimate shows itself not to be significant and the IV estimate's significance is weaker. The latter is still positive, however. If we were to assume age of entrance to be 8 years old, neither Probit nor the IV Probit estimates are significant. There is, therefore, further indication of lack of robustness of the estimates of medium run impact of conflict.

To further enquire into the robustness of the empirical results, the study looked into the decomposition of the sample according to gender and urban/rural residence. As there are some differences in the average attendance of children along these divisions, as discussed in section 4, it also allows some assessment of other possible indirect effects of conflict, namely via income; expected returns to education; and perceptions of access to and quality of education. These were all, as discussed above, demonstrably affected by conflict in other settings.

Table 26: Primary Education Demand – Marginal Effects - Conflict 1: Average killings during life of the child - Decomposition by Gender

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Girls		Boys	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Conflict 1: Average killings during life	**-0.006*** (0.002)**	**0.044** (0.019)**	**-0.006** (0.003)**	**-0.159*** (0.058)**	**-0.005** (0.002)**	**-0.559 (0.367)**
Female	-0.031* (0.016)	-0.032** (0.016)	. .	. .	. .	. .
Age	0.666*** (0.025)	0.252 (0.158)	0.709*** (0.037)	1.959*** (0.482)	0.605*** (0.036)	5.154* (3.019)
Age^2	-0.029*** (0.001)	-0.011 (0.007)	-0.032*** (0.002)	-0.088*** (0.022)	-0.026*** (0.002)	-0.231* (0.136)
Urban	-0.148*** (0.024)	-0.139*** (0.025)	-0.132*** (0.032)	-0.155*** (0.034)	-0.162*** (0.036)	-0.246*** (0.081)

Table 26: Primary Education Demand – Marginal Effects - Conflict 1: Average killings during life of the child - Decomposition by Gender (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Girls		Boys	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Father Attended School	-0.027	-0.030	0.060	0.064	-0.090	-0.070
	(0.046)	(0.046)	(0.065)	(0.065)	(0.063)	(0.064)
Mother Attended School	0.031	0.056	0.017	-0.052	0.028	-0.229
	(0.059)	(0.060)	(0.081)	(0.086)	(0.079)	(0.187)
Migrated	-0.063*	-0.122***	-0.047	0.131	-0.084	0.583
	(0.037)	(0.039)	(0.054)	(0.081)	(0.052)	(0.441)
First Child	0.003	0.007	0.020	0.009	-0.018	-0.057
	(0.019)	(0.019)	(0.027)	(0.027)	(0.027)	(0.039)
Adopted	-0.028	-0.008	-0.002	-0.065	-0.039	-0.275
	(0.061)	(0.060)	(0.068)	(0.072)	(0.078)	(0.174)
Niece/Nephew	0.024	0.019	0.117**	0.135**	-0.056	0.003
	(0.037)	(0.037)	(0.053)	(0.055)	(0.047)	(0.061)
Ln (Household Size)	0.124***	0.115***	0.077*	0.107**	0.178***	0.284***
	(0.029)	(0.030)	(0.041)	(0.043)	(0.041)	(0.083)
Share of boys 0-1	0.324**	0.344**	0.398*	0.329	0.196	-0.039
	(0.143)	(0.144)	(0.211)	(0.215)	(0.171)	(0.227)
Share of boys 2-4	0.423***	0.387***	0.383***	0.494***	0.479***	0.908***
	(0.102)	(0.104)	(0.145)	(0.153)	(0.134)	(0.308)
Share of boys 5-9	0.157*	0.059	0.172	0.485***	0.185*	1.268*
	(0.084)	(0.091)	(0.121)	(0.165)	(0.102)	(0.738)
Share of boys 10-14	0.063	0.079	0.105	0.058	0.030	-0.109
	(0.084)	(0.084)	(0.119)	(0.120)	(0.109)	(0.143)
Share of men above 65	-0.036	-0.102	-0.071	0.128	-0.025	0.706
	(0.182)	(0.186)	(0.227)	(0.245)	(0.279)	(0.550)
Share of girls 0-1	0.251*	0.138	0.315	0.692***	0.189	1.503*
	(0.148)	(0.157)	(0.216)	(0.261)	(0.187)	(0.899)
Share of girls 2-4	0.165	0.184*	0.197	0.146	0.130	-0.078
	(0.109)	(0.109)	(0.153)	(0.154)	(0.139)	(0.199)
Share of girls 5-9	0.298***	0.225***	0.281**	0.498***	0.303***	1.113**
	(0.081)	(0.087)	(0.112)	(0.142)	(0.113)	(0.544)
Share of girls 10-14	0.005	0.013	0.129	0.127	-0.174	-0.226*
	(0.082)	(0.082)	(0.112)	(0.112)	(0.124)	(0.129)
Share of women above 65	0.160	0.105	0.130	0.298	0.215	0.862*
	(0.165)	(0.167)	(0.226)	(0.236)	(0.208)	(0.471)
Completed Years of Education	-0.016**	-0.011	-0.010	-0.029**	-0.022**	-0.089**
	(0.006)	(0.007)	(0.009)	(0.011)	(0.009)	(0.045)
E(Returns to Education)	-4.764***	-2.236	-3.782*	-11.941***	-6.241**	-35.253*
	(1.764)	(2.038)	(2.083)	(3.799)	(2.792)	(19.392)
Average local wage	-0.049	-0.037	-0.064	-0.097	-0.027	-0.141
	(0.042)	(0.044)	(0.063)	(0.065)	(0.055)	(0.101)
Number of cows owned	0.010***	0.011***	0.012***	0.011**	0.008	0.005
	(0.003)	(0.003)	(0.004)	(0.005)	(0.005)	(0.006)
Household had a loan denied	-0.071*	-0.073*	-0.149**	-0.140**	-0.025	0.002
	(0.043)	(0.043)	(0.066)	(0.065)	(0.054)	(0.055)
E (Per capita Monthly Household Income)	0.015***	0.013***	0.011***	0.015***	0.018***	0.032***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.011)
Average local education costs	-0.002**	-0.002**	-0.001	-0.002*	-0.002	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Average local subsidies to education	0.000	0.000	-0.002	-0.001	0.002	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Average time to primary school	-0.001	-0.001	-0.001*	-0.002**	-0.000	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Insufficient Access	-1.747***	-1.759***	-1.733***	-1.690***	-1.640***	-1.626***
	(0.400)	(0.406)	(0.570)	(0.577)	(0.532)	(0.529)
Insufficient Quality	-9.625***	-10.025***	-9.049***	-7.660**	-9.507***	-4.481**
	(2.289)	(2.309)	(2.936)	(2.983)	(3.557)	(1.875)
Insufficient Security	-3.029	-3.437	-5.848	-4.478	0.214	5.967
	(2.957)	(2.995)	(3.898)	(3.925)	(4.274)	(5.803)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6022	6022	2937	2937	3081	3081
Statistics from the underlying regressions						
Pseudo R2	0.3085	0.3069	0.2998	0.2981	0.3357	0.3346
Log-Likelihood	-121425.639	-121698.394	-60723.699	-60866.886	-58986.322	-59087.142

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

The analysis of Table 26 and Table 27suggest that medium-run direct after effects of conflict, beyond eventual effects through channels such as the household's income or school quality, may not be robust. Table 26 below shows estimates of marginal effects for the sub-samples of girls and boys. While the Probit estimates remain relatively robust, the IV Probit estimate of marginal effects for boys (in column 6) is larger than for the full sample but statistically insignificant and the one for girls (in column 4) is now negative, while statistically significant. More important, as it can be seen in Table 53, in the appendix, the test of endogeneity, as per Wooldridge (2010:587), does not reject exogeneity in either case. Therefore, no inference from the instrumental variables regressions on girls and boys is, indeed, valid. The results found when decomposing the sample based on gender, therefore, further suggest a lack of robustness of the instrumental variable estimates. This result suggests particular caution in any affirmation regarding effects of conflict beyond those that may have been generated through the channels of income, expected returns to education or perceived quality of education.

In Table 27 we can see that estimates of the coefficient of the conflict indicator are either statistically insignificant or indicate small effects (a 5% reduction in probability of attendance for a one standard deviation increase of the average number of killings above the average in rural areas and under the Probit estimation, as in column 5). Added to this evidence, it can be seen in Table 54 that, although the first stage regressions suggest that distance to the border is a strong instrument, exogeneity can only be (weakly) rejected in the urban subsample, following Wooldridge (2010:587). The empirical evidence, therefore, suggests evermore caution regarding the robustness of any inference on medium-run impacts of conflict on demand for primary education.

Table 27: Primary Education Demand – Marginal Effects - Conflict 1: Average killings during life of the child - Decomposition Urban / Rural

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Urban		Rural	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Conflict 1: Average killings during life	**-0.006*** (0.002)**	**0.044** (0.019)**	**-0.002 (0.003)**	**0.059 (0.036)**	**-0.007*** (0.002)**	**-0.186 (0.276)**
Female	-0.031*	-0.032**	-0.074***	-0.076***	-0.021	-0.017
	(0.016)	(0.016)	(0.025)	(0.025)	(0.019)	(0.019)
Age	0.666***	0.252	0.716***	0.211	0.658***	2.131
	(0.025)	(0.158)	(0.037)	(0.300)	(0.031)	(2.273)
Age^2	-0.029***	-0.011	-0.034***	-0.011	-0.028***	-0.095
	(0.001)	(0.007)	(0.002)	(0.014)	(0.002)	(0.103)
Urban	-0.148***	-0.139***	.	.	.	.
	(0.024)	(0.025)	.	.	.	.
Father Attended School	-0.027	-0.030	-0.078	-0.081	0.040	0.047
	(0.046)	(0.046)	(0.060)	(0.060)	(0.057)	(0.058)
Mother Attended School	0.031	0.056	0.011	0.038	-0.032	-0.111
	(0.059)	(0.060)	(0.083)	(0.084)	(0.074)	(0.150)
Migrated	-0.063*	-0.122***	-0.063	-0.136**	-0.016	0.201
	(0.037)	(0.039)	(0.040)	(0.054)	(0.059)	(0.336)
First Child	0.003	0.007	0.045	0.050	-0.018	-0.031
	(0.019)	(0.019)	(0.032)	(0.032)	(0.022)	(0.030)
Adopted	-0.028	-0.008	-0.170*	-0.144	0.003	-0.075
	(0.061)	(0.060)	(0.088)	(0.089)	(0.064)	(0.134)
Niece/Nephew	0.024	0.019	0.085*	0.079	-0.000	0.017
	(0.037)	(0.037)	(0.050)	(0.050)	(0.050)	(0.058)
Ln (Household Size)	0.124***	0.115***	0.135***	0.124***	0.106***	0.141**
	(0.029)	(0.030)	(0.044)	(0.045)	(0.038)	(0.066)
Share of boys 0-1	0.324**	0.344**	0.237	0.264	0.362**	0.283
	(0.143)	(0.144)	(0.212)	(0.212)	(0.172)	(0.205)
Share of boys 2-4	0.423***	0.387***	0.506***	0.460***	0.391***	0.529**
	(0.102)	(0.104)	(0.155)	(0.158)	(0.123)	(0.240)
Share of boys 5-9	0.157*	0.059	0.233*	0.112	0.142	0.494
	(0.084)	(0.091)	(0.133)	(0.151)	(0.098)	(0.551)
Share of boys 10-14	0.063	0.079	-0.188	-0.171	0.086	0.042
	(0.084)	(0.084)	(0.121)	(0.122)	(0.100)	(0.123)
Share of men above 65	-0.036	-0.102	0.152	0.080	-0.062	0.170
	(0.182)	(0.186)	(0.264)	(0.271)	(0.213)	(0.426)
Share of girls 0-1	0.251*	0.138	0.234	0.087	0.285	0.722
	(0.148)	(0.157)	(0.235)	(0.254)	(0.175)	(0.693)
Share of girls 2-4	0.165	0.184*	-0.256	-0.235	0.267**	0.204
	(0.109)	(0.109)	(0.178)	(0.179)	(0.127)	(0.158)
Share of girls 5-9	0.298***	0.225***	0.189	0.101	0.339***	0.598
	(0.081)	(0.087)	(0.124)	(0.136)	(0.097)	(0.416)
Share of girls 10-14	0.005	0.013	0.144	0.150	-0.052	-0.063
	(0.082)	(0.082)	(0.119)	(0.119)	(0.099)	(0.101)
Share of women above 65	0.160	0.105	0.622**	0.550**	0.057	0.265
	(0.165)	(0.167)	(0.259)	(0.261)	(0.197)	(0.368)
Completed Years of Education	-0.016**	-0.011	-0.014	-0.007	-0.008	-0.031
	(0.006)	(0.007)	(0.010)	(0.012)	(0.008)	(0.035)
E(Returns to Education)	-4.764***	-2.236	-5.972**	-2.746	-4.157**	-13.693
	(1.764)	(2.038)	(2.533)	(3.274)	(1.923)	(14.599)
Average local wage	-0.049	-0.037	0.002	0.014	-0.099	-0.133
	(0.042)	(0.044)	(0.041)	(0.043)	(0.065)	(0.086)
Number of cows owned	0.010***	0.011***	0.007*	0.007*	0.010**	0.009*
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)
Household had a loan denied	-0.071*	-0.073*	-0.056	-0.057	-0.069	-0.062
	(0.043)	(0.043)	(0.065)	(0.065)	(0.049)	(0.050)
E (Per capita Monthly Household Income)	0.015***	0.013***	0.012***	0.010***	0.014***	0.019**
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.008)
Average local education costs	-0.002**	-0.002**	-0.002**	-0.002**	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Average local subsidies to education	0.000	0.000	0.003	0.003	-0.001	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Average time to primary school	-0.001	-0.001	-0.002	-0.002	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Table 27: Primary Education Demand – Marginal Effects - Conflict 1: Average killings during life of the child - Decomposition Urban / Rural (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Urban		Rural	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Insufficient Access	-1.747***	-1.759***	-1.216	-2.395	-0.814	23.085
	(0.400)	(0.406)	(2.087)	(2.133)	(0.745)	(36.913)
Insufficient Quality	-9.625***	-10.025***	1.818	10.371*	2.668	27.906
	(2.289)	(2.309)	(2.021)	(5.532)	(2.757)	(38.928)
Insufficient Security	-3.029	-3.437	-7.056	32.370	-28.467	-436.889
	(2.957)	(2.995)	(11.584)	(26.851)	(44.536)	(629.256)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6022	6022	2787	2787	3233	3233
Statistics from the underlying regressions						
Pseudo R2	0.3085	0.3069	0.2853	0.2851	0.3373	0.3353
Log-Likelihood	-121425.639	-121698.394	-29587.407	-29595.949	-88364.268	-88633.030

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Finally, robustness tests were conducted to an underlying hypothesis behind the choice of conflict indicator: the location where violence was experienced. Relying on the very low internal migration rate observed in Timor (as referred to in section 4 above), the assumption was that the levels of violence reported in the district of birth of the child and during her life were, in fact, actually witnessed by the household. That would not be the case for those that migrated out of the district during the years of the conflict and were, therefore, somewhere else, experiencing different levels of violence. A robustness test is, then, running the estimation for non-migrants only, as shown in Table 28.

Table 28: Primary Education Demand - Conflict 1: Average killings during life of the child - Robustness to migration

	(1)	(2)	(3)	(4)
	Baseline model		Non-Migrants	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Conflict 1: Average killings during life	-0.023***	0.166**	-0.023***	-0.764*
	(0.007)	(0.071)	(0.007)	(0.461)
N	6022	6022	5822	5822
Log-Likelihood	-121425.639	-121698.394	-117481.805	-117726.589

* p<0.10, ** p<0.05, *** p<0.01. Note: Coefficients of the conflict variables were estimated with the remaining covariates of the study's standard models. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

While the Probit estimate shows to be robust to this change, but still small, the IV Probit coefficient is now negative and weakly significant. It is important to notice that although testing for robustness of the indicator, this test induces a type of selection bias. Those that migrated out of the districts may, themselves, have particular, non-random, preferences. In particular, migrants tend to be more forward looking and investment

prone. Adding to this is the fact that, according to the 2010 Census (National Statistics Directorate and UNFPA, 2011), education is one of the main reasons for migration. Nonetheless, this test adds further suggestions of lack of robustness of the IV Probit coefficient for the impact of conflict, using the indicator of violence as a continuum.

In summary, there is a plausible suggestion of overestimation of the Probit coefficient of the medium-run impact of conflict and, for the full sample, an indication of a possible positive effect on post-conflict preferences for primary education beyond what can possibly be attributed to indirect effects. This indication, however, does not appear to be robust.

There is, however, some other relevant empirical evidence that this study allows us to highlight, regarding drivers of post-conflict demand for primary education in the case of Timor. An analysis of the decompositions in Table 26 and Table 27 reveal that, as suggested by the descriptive statistics, an older child is more likely to attend primary school than a younger child, with a correction with age. This correlation holds for all subsamples, as shown in both tables, although it is not significant in some of the IV Probit regressions. The urban correction factor, suggested in the full sample holds for both girls and boys, as per Table 26. The migration of children only seems to have penalized those that migrated to urban areas, when compared to those that were original residents[69]. The support of a larger household and the presence of younger children of close ages seem to correlate with higher school attendance for boys and girls, both residing in urban or rural settings.

An analysis of possible channels of indirect effects of conflict also shows important insights. The negative partial correlation between returns to education and school

[69] This may suggest some degree of discrimination against them or lack of social support networks to them or their households.

attendance seems to hold for all subsamples. The same happens with the positive partial correlation between a higher household income and demand for primary education. Finally, effects of perceptions of access to school and school quality only seem to hold in the gender decomposition, while not holding in the urban/rural one. These are potential channels through which the experience of conflict may have affected post-conflict demand for primary education. Other effects, beyond these and using the first conflict indicator, while suggesting some higher preference for primary education of those more affected by conflict (but lower of girls) did not show to be robust.

An analysis of the second indicator of conflict reinforces this conjecture.

5.2 Experience of violent shock during the life of the child

As in the case of the previous indicator of conflict, the effect of the Timorese conflict using the experience of a violent shock during the life of the child was estimated using Probit and IV Probit regressions.

Table 29: Primary Education Demand - Standard Models with Conflict 2: Extreme Killings Shock

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Constant	-11.941***	-6.993***	-12.306***	4.315	-12.226***	-4.362
	(0.514)	(1.728)	(0.525)	(3.735)	(0.737)	(3.147)
Conflict 2: Shock of extreme violence during life	**-0.314*** (0.109)**	**2.972*** (1.103)**	**-0.358*** (0.110)**	**10.285*** (2.388)**	**-0.402*** (0.112)**	**4.260** (1.831)**
Female	-0.129**	-0.159***	-0.136**	-0.222***	-0.115*	-0.155**
	(0.059)	(0.059)	(0.060)	(0.062)	(0.060)	(0.062)
Age	2.242***	1.324***	2.373***	-0.903	2.446***	0.998*
	(0.093)	(0.322)	(0.102)	(0.739)	(0.104)	(0.574)
Age^2	-0.098***	-0.059***	-0.105***	0.039	-0.107***	-0.044*
	(0.004)	(0.014)	(0.005)	(0.033)	(0.005)	(0.025)
Urban	-0.055	-0.020	-0.041	0.043	-0.561***	-0.488***
	(0.065)	(0.067)	(0.065)	(0.069)	(0.094)	(0.100)
Father Attended School	0.034	0.086	0.050	0.201	-0.112	-0.017
	(0.184)	(0.183)	(0.186)	(0.183)	(0.176)	(0.176)
Mother Attended School	0.282	0.306	0.296	0.314	0.124	0.164
	(0.256)	(0.250)	(0.246)	(0.241)	(0.224)	(0.223)
Migrated	-0.019	-0.604**	-0.048	-1.952***	-0.195	-0.987***
	(0.148)	(0.244)	(0.138)	(0.446)	(0.139)	(0.317)
First Child	0.047	0.059	0.051	0.047	0.012	0.018
	(0.069)	(0.069)	(0.070)	(0.070)	(0.071)	(0.071)
Adopted	-0.110	0.035	-0.087	0.356	-0.114	0.093
	(0.245)	(0.243)	(0.242)	(0.251)	(0.229)	(0.238)
Niece/Nephew	0.197	0.119	0.178	-0.127	0.099	-0.021
	(0.143)	(0.144)	(0.137)	(0.156)	(0.140)	(0.150)

Table 29: Primary Education Demand - Standard Models with Conflict 2: Extreme Killings Shock (cont)

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Ln (Household Size)	0.080	0.121	0.048	0.149*	0.467***	0.445***
	(0.089)	(0.089)	(0.088)	(0.089)	(0.112)	(0.112)
Share of boys 0-1	0.388	0.401	0.437	0.705	1.242**	1.218**
	(0.531)	(0.534)	(0.532)	(0.534)	(0.543)	(0.542)
Share of boys 2-4	0.809**	0.775**	0.965**	0.868**	1.599***	1.415***
	(0.388)	(0.388)	(0.384)	(0.382)	(0.387)	(0.394)
Share of boys 5-9	0.217	-0.051	0.290	-0.639*	0.584*	0.118
	(0.298)	(0.311)	(0.300)	(0.351)	(0.318)	(0.361)
Share of boys 10-14	-0.296	-0.410	-0.194	-0.588*	0.261	0.015
	(0.307)	(0.309)	(0.305)	(0.311)	(0.316)	(0.339)
Share of men above 65	-0.689	-0.783	-0.671	-0.892	-0.148	-0.324
	(0.680)	(0.690)	(0.672)	(0.686)	(0.683)	(0.696)
Share of girls 0-1	0.204	-0.457	0.298	-1.681**	0.971*	-0.024
	(0.541)	(0.587)	(0.539)	(0.697)	(0.559)	(0.702)
Share of girls 2-4	0.322	0.418	0.387	0.827**	0.622	0.753*
	(0.407)	(0.419)	(0.402)	(0.421)	(0.411)	(0.416)
Share of girls 5-9	0.827***	0.685**	0.824***	0.286	1.115***	0.815**
	(0.304)	(0.307)	(0.302)	(0.325)	(0.307)	(0.334)
Share of girls 10-14	-0.174	-0.293	-0.102	-0.617*	0.041	-0.214
	(0.309)	(0.310)	(0.306)	(0.319)	(0.312)	(0.335)
Share of women above 65	0.648	0.641	0.672	0.686	0.594	0.583
	(0.664)	(0.658)	(0.639)	(0.631)	(0.626)	(0.623)
Completed Years of Education			-0.008	0.099***	-0.064***	-0.009
			(0.023)	(0.034)	(0.024)	(0.035)
E(Returns to Education)			-15.856**	41.757***	-18.880***	6.493
			(6.991)	(14.738)	(6.828)	(12.359)
Average local wage			0.115	0.071	-0.187	-0.149
			(0.159)	(0.156)	(0.157)	(0.164)
Number of cows owned			0.059***	0.069***	0.037***	0.045***
			(0.013)	(0.013)	(0.013)	(0.013)
Household had a loan denied			-0.525***	-0.273	-0.279*	-0.200
			(0.162)	(0.166)	(0.162)	(0.163)
E (Per capita Monthly Household Income)					0.055***	0.046***
					(0.009)	(0.010)
Average local education costs					-0.006**	-0.007***
					(0.003)	(0.002)
Average local subsidies to education					0.000	0.004
					(0.008)	(0.007)
Average time to primary school					-0.003	-0.002
					(0.002)	(0.002)
Insufficient Access					-6.686***	-6.145***
					(1.515)	(1.580)
Insufficient Quality					-36.337***	-40.529***
					(8.617)	(8.705)
Insufficient Security					-12.039	-14.527
					(11.104)	(11.319)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6031	6022	6031	6022	6022	6022
r2	0.2848	0.2873	0.2957	0.2981	0.3092	0.3069
Ll	-125714.202	-125137.403	-123800.885	-123247.845	-121308.848	-121698.394

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

As before, the IV approach, using distance to the border as an instrument, found empirical evidence that this instrument was a significant and strong regressor, as per the Sargan test, and the exclusion restriction test rejected the null of exogeneity, following the procedure presented in Wooldridge (2010:587). The robustness of the coefficient of

impact was also tested through the stepwise addition of correlates of demand for education theoretically and empirically established in other settings, as it can be seen in Table 29, Table 30 and Table 55 (this latter one in the appendix). Not only the coefficients remain significant, the duality of sign found with the previous indicator reveals itself again.

Table 30: Primary Education Demand – Marginal Effects - Standard Models with Conflict 2: Extreme Killings Shock

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Conflict 2: Shock of extreme violence during life	**-0.086*** (0.030)**	**0.813*** (0.300)**	**-0.097*** (0.030)**	**2.768*** (0.635)**	**-0.106*** (0.029)**	**1.131** (0.484)**
Female	-0.035** (0.016)	-0.043*** (0.016)	-0.037** (0.016)	-0.060*** (0.017)	-0.030* (0.016)	-0.041** (0.016)
Age	0.614*** (0.020)	0.362*** (0.088)	0.640*** (0.022)	-0.243 (0.199)	0.647*** (0.022)	0.265* (0.152)
Age^2	-0.027*** (0.001)	-0.016*** (0.004)	-0.028*** (0.001)	0.010 (0.009)	-0.028*** (0.001)	-0.012* (0.007)
Urban	-0.015 (0.018)	-0.005 (0.018)	-0.011 (0.018)	0.011 (0.018)	-0.148*** (0.024)	-0.129*** (0.026)
Father Attended School	0.009 (0.050)	0.023 (0.050)	0.013 (0.050)	0.054 (0.049)	-0.030 (0.046)	-0.004 (0.047)
Mother Attended School	0.077 (0.070)	0.084 (0.068)	0.080 (0.066)	0.084 (0.065)	0.033 (0.059)	0.043 (0.059)
Migrated	-0.005 (0.040)	-0.165** (0.066)	-0.013 (0.037)	-0.525*** (0.119)	-0.052 (0.037)	-0.262*** (0.084)
First Child	0.013 (0.019)	0.016 (0.019)	0.014 (0.019)	0.013 (0.019)	0.003 (0.019)	0.005 (0.019)
Adopted	-0.030 (0.067)	0.010 (0.066)	-0.023 (0.065)	0.096 (0.067)	-0.030 (0.060)	0.025 (0.063)
Niece/Nephew	0.054 (0.039)	0.032 (0.039)	0.048 (0.037)	-0.034 (0.042)	0.026 (0.037)	-0.006 (0.040)
Ln (Household Size)	0.022 (0.024)	0.033 (0.024)	0.013 (0.024)	0.040* (0.024)	0.123*** (0.029)	0.118*** (0.030)
Share of boys 0-1	0.106 (0.145)	0.110 (0.146)	0.118 (0.143)	0.190 (0.143)	0.328** (0.143)	0.323** (0.143)
Share of boys 2-4	0.221** (0.106)	0.212** (0.106)	0.260** (0.103)	0.234** (0.103)	0.423*** (0.102)	0.376*** (0.105)
Share of boys 5-9	0.059 (0.082)	-0.014 (0.085)	0.078 (0.081)	-0.172* (0.094)	0.154* (0.084)	0.031 (0.096)
Share of boys 10-14	-0.081 (0.084)	-0.112 (0.085)	-0.052 (0.082)	-0.158* (0.084)	0.069 (0.084)	0.004 (0.090)
Share of men above 65	-0.189 (0.186)	-0.214 (0.189)	-0.181 (0.181)	-0.240 (0.185)	-0.039 (0.181)	-0.086 (0.185)
Share of girls 0-1	0.056 (0.148)	-0.125 (0.160)	0.080 (0.145)	-0.453** (0.187)	0.257* (0.148)	-0.006 (0.186)
Share of girls 2-4	0.088 (0.111)	0.114 (0.114)	0.104 (0.108)	0.223** (0.113)	0.164 (0.108)	0.200* (0.110)
Share of girls 5-9	0.226*** (0.083)	0.187** (0.084)	0.222*** (0.081)	0.077 (0.087)	0.295*** (0.081)	0.216** (0.089)
Share of girls 10-14	-0.048 (0.085)	-0.080 (0.085)	-0.028 (0.082)	-0.166* (0.086)	0.011 (0.082)	-0.057 (0.089)
Share of women above 65	0.177 (0.182)	0.175 (0.180)	0.181 (0.172)	0.185 (0.170)	0.157 (0.165)	0.155 (0.165)
Completed Years of Education			-0.002 (0.006)	0.027*** (0.009)	-0.017*** (0.006)	-0.002 (0.009)

Table 30: Primary Education Demand – Marginal Effects - Standard Models with Conflict 2: Extreme Killings Shock

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual, Household & Local		+ Education as Investment		Standard Model	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
E(Returns to Education)			-4.275**	11.238***	-4.989***	1.724
			(1.878)	(3.948)	(1.797)	(3.280)
Average local wage			0.031	0.019	-0.050	-0.040
			(0.043)	(0.042)	(0.042)	(0.043)
Number of cows owned			0.016***	0.018***	0.010***	0.012***
			(0.003)	(0.003)	(0.003)	(0.004)
Household had a loan denied			-0.142***	-0.073	-0.074*	-0.053
			(0.044)	(0.045)	(0.043)	(0.043)
E (Per capita Monthly Household Income)					0.015***	0.012***
					(0.002)	(0.003)
Average local education costs					-0.002**	-0.002***
					(0.001)	(0.001)
Average local subsidies to education					0.000	0.001
					(0.002)	(0.002)
Average time to primary school					-0.001	-0.001
					(0.001)	(0.001)
Insufficient Access					-1.767***	-1.631***
					(0.400)	(0.419)
Insufficient Quality					-9.603***	-10.758***
					(2.270)	(2.300)
Insufficient Security					-3.182	-3.856
					(2.932)	(3.000)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6031	6022	6031	6022	6022	6022

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Although the indication of a shock would suggest reading the marginal effect result directly, the values would be misleading. Again, although counter-intuitively, it is more meaningful to translate the impact of a one standard deviation equivalent change in the (let us call it for the sake of the interpretation) *probability of having experienced the violent 1999 post-referendum shock.* In this case, such an increase (of 40%) translates into a probability of such a child having attended primary education in 2004/05 lower, on average, in 4% if considering the (likely to be overestimated) Probit estimate, or higher in 45% if considering the IV Probit estimate. Again, such a high potential correction of the coefficient, together with much higher standard deviations, suggests the need to control for its robustness. A further robustness test was added in this case. The analysis was to test the effects of extreme shocks of violence, defined as the experience of at least a year when the number of killings and disappearances reported in the district of birth exceeded the yearly average for all districts throughout the 25 years of Indonesian occupation in two standard deviations. In Table 31, below, the values of

the coefficients result from a complete empirical model with the threshold defined, with alternatives of one and three standard deviations in excess of the average. The signs and statistical significance of the coefficients, both in the Probit and IV Probit estimations hold, despite, again, of higher standard deviations, indicators of lower efficiency of the latter estimations.

Table 31: Primary Education Demand - robustness threshold of extreme violence

	(1)	(2)	(3)	(4)	(5)	(6)
	Threshold = +1 Standard Dev.		Baseline		Threshold = +3 Standard Dev.	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Conflict 2: Shock of extreme violence during life	-0.568*** (0.097)	1.649** (0.709)	-0.402*** (0.112)	4.260** (1.831)	-0.402*** (0.112)	4.260** (1.831)
N	6022	6022	6022	6022	6022	6022
Log-Likelihood	-120627.692	-121698.393	-121308.848	-121698.394	-121308.848	-121698.394

* p<0.10, ** p<0.05, *** p<0.01 Note: Coefficients of the conflict variables were estimated with the remaining covariates of the study's standard models. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Following a robustness test strategy similar to the one explored above, the lateness of entry into primary school can be explored. Table 56, in the appendix, shows the estimates of medium run effects of conflict considering different age cohorts to account for later entry. When the age of entrance is assumed to be higher than 6, neither the Probit nor the IV Probit estimates are significant, reinforcing, therefore, the indication of a lack of robustness of the estimates of medium run impact of conflict.

The same can be read from the estimates in Table 32 and Table 33 and the first stage tests for the IV regressions in Table 57 and Table 58. As it can be seen, the IV Probit estimates do not show themselves to be robust to the decomposition. In fact, although distance to the border is shown to be a strong regressor of the conflict indicator, exogeneity cannot be rejected and the IV estimates for girls and boys cannot be used in inference. Therefore, an equally negative and significant IV Probit coefficient of the conflict indicator, found in the regression on the subsample of girls, fails to be valid for inference. The IV estimates for Rural and Urban subsamples are also not valid for inference for, as it can be seen in Table 58, the Wooldridge test of significance of the

residual does not allow us to reject the exogeneity of the experience of conflict to unknown drivers of demand for education, using distance to the border as an instrument. A robustness test performed in the location where violence was experienced, as presented in Table 34[70], gives the same indication.

On the other hand, the empirical results regarding structural drivers of demand for primary education in the empirical models that incorporate the experience of the 1999 post-referendum violent shock hold with the same signs and significance as reported in the case of the use of average killings during the life of the child as a proxy of conflict.

Table 32: Primary Education Demand– Marginal Effects - Conflict 2: Shock of extreme violence during life of child - Decomposition by Gender

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Girls		Boys	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Conflict 2: Shock of extreme violence during life	-0.106***	1.131**	-0.116***	-1.817***	-0.083**	-0.131
	(0.029)	(0.484)	(0.043)	(0.668)	(0.041)	(2.669)
Female	-0.030*	-0.041**	.	.	.	.
	(0.016)	(0.016)	.	.	.	.
Age	0.647***	0.265*	0.689***	1.216***	0.588***	0.601
	(0.022)	(0.152)	(0.032)	(0.211)	(0.032)	(0.826)
Age^2	-0.028***	-0.012*	-0.031***	-0.054***	-0.025***	-0.026
	(0.001)	(0.007)	(0.002)	(0.009)	(0.002)	(0.036)
Urban	-0.148***	-0.129***	-0.133***	-0.157***	-0.162***	-0.162***
	(0.024)	(0.026)	(0.032)	(0.035)	(0.036)	(0.052)
Father Attended School	-0.030	-0.004	0.059	0.020	-0.093	-0.093
	(0.046)	(0.047)	(0.065)	(0.067)	(0.063)	(0.084)
Mother Attended School	0.033	0.043	0.019	0.009	0.029	0.029
	(0.059)	(0.059)	(0.082)	(0.082)	(0.080)	(0.082)
Migrated	-0.052	-0.262***	-0.030	0.251**	-0.078	-0.063
	(0.037)	(0.084)	(0.055)	(0.118)	(0.051)	(0.460)
First Child	0.003	0.005	0.018	0.018	-0.017	-0.018
	(0.019)	(0.019)	(0.027)	(0.027)	(0.027)	(0.027)
Adopted	-0.030	0.025	-0.005	-0.080	-0.040	-0.044
	(0.060)	(0.063)	(0.068)	(0.074)	(0.079)	(0.141)
Niece/Nephew	0.026	-0.006	0.116**	0.164***	-0.052	-0.054
	(0.037)	(0.040)	(0.053)	(0.058)	(0.047)	(0.080)
Ln (Household Size)	0.123***	0.118***	0.076*	0.084**	0.177***	0.178***
	(0.029)	(0.030)	(0.041)	(0.041)	(0.041)	(0.043)
Share of boys 0-1	0.328**	0.323**	0.404*	0.400*	0.197	0.198
	(0.143)	(0.143)	(0.212)	(0.212)	(0.171)	(0.171)
Share of boys 2-4	0.423***	0.376***	0.388***	0.445***	0.474***	0.486***
	(0.102)	(0.105)	(0.145)	(0.148)	(0.134)	(0.174)
Share of boys 5-9	0.154*	0.031	0.178	0.358***	0.179*	0.183
	(0.084)	(0.096)	(0.121)	(0.137)	(0.103)	(0.285)
Share of boys 10-14	0.069	0.004	0.101	0.202	0.037	0.046
	(0.084)	(0.090)	(0.119)	(0.128)	(0.109)	(0.188)
Share of men above 65	-0.039	-0.086	-0.076	-0.013	-0.027	-0.024
	(0.181)	(0.185)	(0.225)	(0.232)	(0.279)	(0.296)

[70] The same caveat on the fact that this robustness test in itself generates a selection bias that may contribute to the result found.

Table 32: Primary Education Demand– Marginal Effects - Conflict 2: Shock of extreme violence during life of child - Decomposition by Gender (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Girls		Boys	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Share of girls 0-1	0.257*	-0.006	0.320	0.714***	0.193	0.202
	(0.148)	(0.186)	(0.216)	(0.266)	(0.186)	(0.622)
Share of girls 2-4	0.164	0.200*	0.201	0.152	0.126	0.125
	(0.108)	(0.110)	(0.152)	(0.154)	(0.139)	(0.162)
Share of girls 5-9	0.295***	0.216**	0.276**	0.385***	0.302***	0.311
	(0.081)	(0.089)	(0.112)	(0.121)	(0.113)	(0.198)
Share of girls 10-14	0.011	-0.057	0.140	0.247**	-0.173	-0.172
	(0.082)	(0.089)	(0.112)	(0.122)	(0.124)	(0.201)
Share of women above 65	0.157	0.155	0.131	0.117	0.212	0.219
	(0.165)	(0.165)	(0.226)	(0.225)	(0.208)	(0.207)
Completed Years of Education	-0.017***	-0.002	-0.010	-0.032***	-0.022**	-0.023
	(0.006)	(0.009)	(0.009)	(0.012)	(0.009)	(0.034)
E(Returns to Education)	-4.989***	1.724	-4.079*	-13.700***	-6.341**	-6.705
	(1.797)	(3.280)	(2.145)	(4.358)	(2.813)	(15.069)
Average local wage	-0.050	-0.040	-0.066	-0.076	-0.026	-0.026
	(0.042)	(0.043)	(0.062)	(0.063)	(0.055)	(0.057)
Number of cows owned	0.010***	0.012***	0.011**	0.009**	0.008	0.008
	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
Household had a loan denied	-0.074*	-0.053	-0.150**	-0.177***	-0.029	-0.028
	(0.043)	(0.043)	(0.066)	(0.065)	(0.054)	(0.068)
E (Per capita Monthly Household Income)	0.015***	0.012***	0.011***	0.015***	0.018***	0.018***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.006)
Average local education costs	-0.002**	-0.002***	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Average local subsidies to education	0.000	0.001	-0.002	-0.003	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)
Average time to primary school	-0.001	-0.001	-0.001*	-0.002**	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Insufficient Access	-1.767***	-1.631***	-1.744***	-1.903***	-1.665***	-1.687***
	(0.400)	(0.419)	(0.569)	(0.591)	(0.534)	(0.573)
Insufficient Quality	-9.603***	-10.758***	-9.059***	-7.271**	-9.472***	-9.367**
	(2.270)	(2.300)	(2.930)	(3.002)	(3.532)	(4.750)
Insufficient Security	-3.182	-3.856	-5.869	-4.677	-0.014	0.522
	(2.932)	(3.000)	(3.883)	(3.922)	(4.239)	(4.998)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6022	6022	2937	2937	3081	3081
Statistics from the underlying regressions						
Pseudo R2	0.3092	0.3069	0.3007	0.2981	0.3360	0.3346
Log-Likelihood	-121308.848	-121698.394	-60645.659	-60866.886	-58963.061	-59087.143

Table 33: Primary Education Demand – Marginal Effects - Conflict 2: Shock of extreme violence during life of child - Decomposition Urban / Rural

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Urban		Rural	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Conflict 2: Shock of extreme violence during life of child	**-0.106*** (0.029)**	**1.131** (0.484)**	**-0.009 (0.048)**	**1.516 (0.927)**	**-0.159*** (0.035)**	**10.092 (15.712)**
Female	-0.030*	-0.041**	-0.075***	-0.089***	-0.021	-0.109
	(0.016)	(0.016)	(0.025)	(0.026)	(0.019)	(0.140)
Age	0.647***	0.265*	0.699***	0.228	0.655***	-2.523
	(0.022)	(0.152)	(0.029)	(0.290)	(0.028)	(4.860)
Age^2	-0.028***	-0.012*	-0.033***	-0.012	-0.028***	0.111
	(0.001)	(0.007)	(0.002)	(0.013)	(0.001)	(0.213)
Urban	-0.148***	-0.129***	.	.	.	.
	(0.024)	(0.026)	.	.	.	.
Father Attended School	-0.030	-0.004	-0.079	-0.047	0.036	0.254
	(0.046)	(0.047)	(0.060)	(0.063)	(0.057)	(0.338)

Table 33: Primary Education Demand – Marginal Effects - Conflict 2: Shock of extreme violence during life of child - Decomposition Urban / Rural (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Urban		Rural	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of child, between ages 6 and 14, to have attended school in the 2004/05 school year						
Mother Attended School	0.033	0.043	0.011	0.021	-0.031	0.049
	(0.059)	(0.059)	(0.082)	(0.083)	(0.075)	(0.136)
Migrated	-0.052	-0.262***	-0.063	-0.324**	-0.027	-1.741
	(0.037)	(0.084)	(0.042)	(0.157)	(0.059)	(2.680)
First Child	0.003	0.005	0.046	0.047	-0.019	-0.007
	(0.019)	(0.019)	(0.032)	(0.032)	(0.022)	(0.028)
Adopted	-0.030	0.025	-0.170*	-0.101	-0.002	0.459
	(0.060)	(0.063)	(0.088)	(0.097)	(0.064)	(0.711)
Niece/Nephew	0.026	-0.006	0.085*	0.047	0.003	-0.260
	(0.037)	(0.040)	(0.050)	(0.056)	(0.050)	(0.403)
Ln (Household Size)	0.123***	0.118***	0.135***	0.128***	0.104***	0.060
	(0.029)	(0.030)	(0.044)	(0.044)	(0.037)	(0.079)
Share of boys 0-1	0.328**	0.323**	0.239	0.236	0.377**	0.343**
	(0.143)	(0.143)	(0.212)	(0.212)	(0.172)	(0.175)
Share of boys 2-4	0.423***	0.376***	0.505***	0.446***	0.397***	-0.011
	(0.102)	(0.105)	(0.155)	(0.159)	(0.123)	(0.637)
Share of boys 5-9	0.154*	0.031	0.229*	0.075	0.146	-0.895
	(0.084)	(0.096)	(0.132)	(0.163)	(0.098)	(1.596)
Share of boys 10-14	0.069	0.004	-0.187	-0.272**	0.094	-0.477
	(0.084)	(0.090)	(0.121)	(0.133)	(0.100)	(0.888)
Share of men above 65	-0.039	-0.086	0.156	0.101	-0.055	-0.449
	(0.181)	(0.185)	(0.265)	(0.269)	(0.211)	(0.617)
Share of girls 0-1	0.257*	-0.006	0.230	-0.106	0.294*	-1.942
	(0.148)	(0.186)	(0.235)	(0.317)	(0.174)	(3.449)
Share of girls 2-4	0.164	0.200*	-0.257	-0.214	0.266**	0.564
	(0.108)	(0.110)	(0.178)	(0.180)	(0.126)	(0.479)
Share of girls 5-9	0.295***	0.216**	0.186	0.089	0.342***	-0.323
	(0.081)	(0.089)	(0.124)	(0.140)	(0.096)	(1.015)
Share of girls 10-14	0.011	-0.057	0.145	0.056	-0.044	-0.638
	(0.082)	(0.089)	(0.119)	(0.130)	(0.099)	(0.922)
Share of women above 65	0.157	0.155	0.619**	0.617**	0.059	0.045
	(0.165)	(0.165)	(0.259)	(0.259)	(0.199)	(0.199)
Completed Years of Education	-0.017***	-0.002	-0.014	0.005	-0.009	0.116
	(0.006)	(0.009)	(0.010)	(0.016)	(0.008)	(0.193)
E(Returns to Education)	-4.989***	1.724	-5.882**	2.563	-4.593**	52.024
	(1.797)	(3.280)	(2.523)	(5.921)	(2.000)	(87.147)
Average local wage	-0.050	-0.040	0.002	0.011	-0.099	-0.031
	(0.042)	(0.043)	(0.042)	(0.043)	(0.063)	(0.121)
Number of cows owned	0.010***	0.012***	0.007*	0.009**	0.010**	0.026
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.023)
Household had a loan denied	-0.074*	-0.053	-0.055	-0.030	-0.071	0.089
	(0.043)	(0.043)	(0.065)	(0.067)	(0.049)	(0.253)
E (Per capita Monthly Household Income)	0.015***	0.012***	0.012***	0.009**	0.015***	-0.006
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.032)
Average local education costs	-0.002**	-0.002***	-0.002**	-0.002***	-0.001	-0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Average local subsidies to education	0.000	0.001	0.003	0.004	-0.001	0.005
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.010)
Average time to primary school	-0.001	-0.001	-0.002	-0.002	-0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Insufficient Access	-1.767***	-1.631***	-1.314	-0.603	-0.548	-73.437
	(0.400)	(0.419)	(2.074)	(2.142)	(0.744)	(111.547)
Insufficient Quality	-9.603***	-10.758***	2.106	15.915*	2.978	-76.955
	(2.270)	(2.300)	(2.053)	(8.778)	(2.815)	(122.521)
Insufficient Security	-3.182	-3.856	-5.704	66.796	-32.514	1220.216
	(2.932)	(3.000)	(11.700)	(46.760)	(45.456)	(1921.537)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6022	6022	2787	2787	3233	3233
Statistics from the underlying regressions						
Pseudo R^2	0.3092	0.3069	0.2851	0.2851	0.3400	0.3353
Log-Likelihood	-121308.848	-121698.394	-29595.247	-29595.949	-88011.692	-88634.892

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Table 34: Primary Education Demand - Conflict 2: Shock of extreme violence during life of child - Robustness to migration

	(1)	(2)	(3)	(4)
	Baseline model		Non-Migrants	
	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se
Conflict 2: Years with extreme kills during life	-0.402***	4.260**	-0.404***	-10.015**
	(0.112)	(1.831)	(0.123)	(4.531)
N	6022	6022	5822	5822
Log-Likelihood	-121308.848	-121698.394	-117400.671	-117726.589

* p<0.10, ** p<0.05, *** p<0.01. Note: Coefficients of the conflict variables were estimated with the remaining covariates of the study's standard models. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

6- Discussion of results and conclusion

As suggested by qualitative research conducted in Timor - including life story interviews - and by the descriptive statistics presented, there is an indication of a slightly higher attendance in primary education among those children that experienced the Timorese conflict, five years after it ended. This higher attendance occurs despite impacts of conflict on income and quality of education that are likely to induce a contrary effect. This would suggest that another sort of impact could be present, namely, of an induced higher preference for education as a resilience effect[71]. The empirical evidence for the full sample appears to suggest this to be the case. However, the result proves itself not to be robust and should not, therefore, be affirmed as externally valid.

This empirical result cannot be analysed without looking into the characteristics and limitations of the empirical strategy used. While the IV approach that was applied revealed a source of endonegeity (one that suggested overestimation of negative effects of conflict over demand for education), the lack of robustness of the IV coefficient on either conflict indicator suggests that other sources of endogeneity may be present. As Heckman and Urzua (2009:17) argue, 'in a heterogeneous model, different instruments will give different estimates'. In this case, the same instrument, in different samplings of the heterogeneous reality of post-conflict Timor-Leste gave different, contradictory,

[71] This could, for instance, take the form of longer foresight or preference for the future that could be modelled as a reduction on time discount rate. Households that experienced more violence, after peace ensued may have experienced a stronger change of expectations, valuing the future more and therefore being more willing to save now for education.

estimates. That was particularly the case for the subsamples of girls and of non-migrants. This happened despite the fact that the instrument, already explored by Justino et al. (2013, 2011), was found to be a significant regressor of both the proxies of conflict used and that it also passed the exclusion test. It therefore suggests that, particularly in the cases of the referred subsamples the instrument is picking up other sources of endogeneity. Such a situation precludes any certainty in the inference of other possible medium-term impacts of the experience of conflict beyond those that may arise through income or quality of education. Further research should try to unpick the possible different sources of endogeneity, starting with the subgroups of girls and those that do not migrate out of their districts.

Avenues of enquiry on how to robustly infer the existence of the impacts suggested by the regression on the full sample, could examine other alternative pathways.

A first approach would be to depart from the assumption that the experience of conflict by children may be the only channel of direct impacts of conflict on demand for education. It is clear that parents, and not children, play the most significant role in determining the decision about them attending school, at least until a certain age. As discussed in section 2, the assumption was one of intra-household altruism, by which the decision makers recognize and value the children's experience of violence or are sensitized by the extreme risks incurred by children during their first years of life. It may be the case that it is the parents' own experience of violence that influences the decision. In the earlier analysis this hypothesis was tested, using the head of household as a proxy (as the dataset has information gaps on the children's parents). The empirical estimates of indicators of violence witnessed by the head of household were, however, found to be non-significant.

Another possibility would be to consider the full experience of conflict by the household as a whole, during the 25 years of conflict. This would account for spill-over effects that an analysis of violence experienced only during the life of the child may have overlooked. However, the data available on conflict only allows disaggregation by district and year of occurrence. We are, therefore, unable to differentiate the experience of violence by the households along the timeline (as all of them exist, with different compositions, before, throughout and after the conflict). The only heterogeneity identifiable would be according to the 13 Timorese districts, differentiating the experience of conflict of each household solely according to what districts were more affected and what were affected the least. This would not allow for a strong enough identification of impacts of conflict.

On the other hand, it may be the case that children may be able to recover from the violence they experienced during the conflict without significant medium-run impacts. This would mean that no significant effect of conflict would arise on the preferences of children for education (or their parents), beyond those that occur via the channels of income and perceptions of school quality. If this is the case, there is still space to enquire into the impacts of conflict on higher levels of education, looking at adolescents. These can play a more significant role in their educational choices. They also experienced the most extreme events of violence of the later period of the Indonesian occupation at an older age and may have clearer memories (and higher trauma) from them, but also a clearer perception of the dynamics of post-conflict reconstruction, with possible resilience effects. This approach is followed in Chapter 3, where robust findings seem to suggest that possible resilience effects may lead those that experienced shocks of extreme violence to be more likely to attend secondary

school. This effect appears to hold as robust and significant in the presence of other significant drivers of demand.

It is important to notice that this present study did find evidence of channels through which conflict might impact demand for primary education. These channels were: first, that conflict might have particularly affected household's income generating capacities and, through it, reduced demand for primary education; second, that conflict might have reduced the quality of education to such a degree that it had not recovered five years post-conflict, again with detrimental effects on demand for primary education. On both accounts, there is evidence that Timor-Leste in 2004/05 had yet not fully recovered from the conflict. The results in this study established that the household income and perceived quality are significant drivers of demand for primary education and, therefore, possible channels of legacies of conflict in the medium-run. Although evidence in other settings suggests both channels to be affected by conflict, further research should evaluate whether and how these impacts occurred in the medium-run in Timor-Leste.

The results found in this study also suggest the need for further research on the relation between expected returns to education and demand for primary education. The evidence suggested that households might face liquidity constraints; future research should validate this insight, since this dimension not only affects education, but can reinforce poverty traps, as found by Masset (2010).

The evidence found on both income and perceived quality of education recommend that policy should focus on these significant channels through which the experience of conflict may leave legacies in the medium-run. It should focus, therefore, on the supply side of primary education, particularly on the quality of provision. It should, however, not overlook significant signals of demand restrictions, particularly income related ones.

They also recommend a particular focus on possible discrimination, not only gender based but, in an ethnically diverse post-conflict setting such as Timor-Leste is, also on migrant children in urban settings, so as to prevent possible sources of grievance.

Chapter 3: A peace dividend on secondary education? Analysis of post-conflict demand for education and legacies of conflict in Timor-Leste[72]

It is hard to contest that education is a societal investment. The correlation of higher schooling and higher performance in other indicators of human development is well established and emphasized by many studies, from Lucas (1988), Mankiw et al. (1992), Barro and Lee (1994), Gregorio and Lee (2002), Breierova and Duflo (2004) to Cutler et al. (2006)[73]. This agreement contributed to make Education one of the Millennium Development Goals (MDGs). Previously, in 1990 at Jomtien, the Education for All (EFA) initiative had been launched, establishing the goal of Universal Primary Education (UPE), which eventually became inscribed in the MDGs. This led some governments to devote as much as 70% of their education budget to the primary level (Lewin, 2005). However, Lewin, as well as other authors such as Brown (2005) or Tilak (2007) and multilateral agencies such as the World Bank (2005) stress the need to increase the focus on the next levels of education.

As Lewin (2005) highlights, getting educated beyond primary level is considered a source of income opportunity worth of private investment by poor households and economic elites alike. Lewin also stresses that access to secondary education is important for achieving universal primary education: it is both an incentive for primary education completion, and a required step in the training of primary school teachers.

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[73] As reviewed by Barro and Lee (2013).

In the run-up to a post-2015 Sustainable Development Goals framework, it is key to ascertain what hinders or drives the attainment of education beyond primary school in developing countries[74]. However, there is a gap here, as most research still lies on higher education in more developed countries while most research on education in poorer developing countries has not looked beyond primary education. Secondary education in the poorest countries of the world has largely been under-researched.

A few studies have sought to fill this gap. They include Appleton et al. (1996), looking at the links between primary and post-primary education in Côte d'Ivoire and Uganda, Palmer (2005) on Ghana, Wedgwood (2005) on Tanzania, Hayman (2005) on the contribution of post-primary education to poverty reduction in Rwanda, Tilak (2007) on India, Atchoaréna et al. (2008) on Cabo Verde, Chimombo (2009) on private provision of education in Malawi, Ohba (2011) on Kenya[75]. While this literature represents a new focus being directed to secondary education, it still leaves significant gaps.

A particularly significant gap is found in the understanding of what may drive or hinder higher attendance of secondary education in post-conflict settings. This is of particular importance as countries classified as "fragile" have failed to achieve the MDGs targets on education (UNESCO, 2011).

The education prospects of youth, and the incentives for them to attend secondary education, are particularly relevant in post-conflict countries where the "youth bulge"[76] is a security risk (Goldsmith, 2009; Huntington, 1996; Urdal, 2006; Urdal and

[74] The goal of extending non-discriminatory access to universal secondary education is already part of the proposal for the Sustainable Development Goals (Open Working Group for Sustainable Development Goals, 2014).
[75] Another notable example is the study by Borooah and Knox (2014) on education performance in Northern Ireland as this could be classified as a post-conflict country.
[76] This term applies to situations, particularly common in least developed countries, where the advances in reduction of infant mortality lead to a significant proportion of the population to be under 15 years old or, more generally, under the active age.

Hoelscher, 2009). Drawing on the example of post-conflict Rwanda, Hayman (2005) already had highlighted that post-basic education and training are seen as instrumental in the country's human capital development policy.

Yet a study of demand for secondary education in a post-conflict setting is lacking. A focus exists, with studies such as Rose and Greeley (2006) recommending an attention to be given to the provision of secondary education, among other measures. Recommendations such as these, focusing on the supply side of education, need to be complemented by an analysis of the demand side, to validate their effectiveness.

An understanding of what drives the household's choices on secondary education is not complete without acknowledging the role played by conflict. The empirical research on impacts of conflict over education does point for negative effects in its duration and in the short-run post-conflict stages. However, no knowledge exists of eventual persistence, reduction or reversion of those effects in the medium-run, when the countries still face a situation of relative fragility. This study brings the existing literature on secondary education in developing countries into a dialogue with the microeconomics of conflict, as a way to assess the medium-run impacts of conflict on demand for secondary education.

It focuses on Timor-Leste, a post-conflict country, classified as "fragile"[77] and founder of the g7+ group, an association of countries self-defined as "a voluntary association of countries that are or have been affected by conflict" (g7+ Secretariat, 2014). This small island country became independent in 2003, after 500 years of Portuguese colonization,

[77] The World Bank lists 33 countries as fragile and conflict affected. The Fund For Peace lists 35 countries from "alert" to "very high alert" and still other 32 as "very high warning of fragility". The OECD listed 51 countries as fragile in 2014. Timor-Leste is nominated in all these sets.

a military occupation by Indonesia from 1975 to 1999 and a period of transitional rule by the United Nations.

This study focuses on the school year of 2004/05, five years after the conflict with Indonesia ended. The violence the Timorese experienced during that conflict varied depending on where they lived – it was much more pronounced in some districts than in others – and on their age, among other factors. This heterogeneity allows for an empirical analysis of impacts of conflict on post-conflict demand for secondary education. In this study, the impact of conflict will focus on the experience of extreme violence during the time of the conflict and when those that were adolescents in 2004/05 (aged between 12 and 18) were of school age.

Demand for secondary education will be analysed following an inter-temporal investment theoretical approach where attendance to school is a decision made by the household, but most decisively by the adolescent herself[78]. As presented in section 2, the decision on whether or not to attend secondary school is assumed to be based on the expected returns to education (as education is viewed as an investment), its cost, and its quality. The study also assumes that five years after the end of the conflict, demand for secondary education may still be affected by violence experienced due to the conflict - a hypothesis that is tested in this study.

The empirical model, following the conceptual discussion of section 2 will be first estimated through a Binomial Probit with Selection regression, also known as Heckman-Probit (HP). It will also be estimated through an IV Probit and a simple Probit regression. Endogeneity of the household's income is tested and corrected through an

[78] While addressing the education of all adolescents, girls and boys, for simplicity and in acknowledgement of the equal importance of both genders, the individuals in the text will always be referred as "she" or "her".

Instrumental Variables (IV) approach. Endogeneity of conflict is also discussed and accounted for through an IV approach. The empirical strategy is presented and discussed is section 3.

The data used for this analysis, presented in section 4, comes from the Timor-Leste Survey of Living Standards of 2007 (TLSLS, 2007), in which 25,000 people (4,470 households) from all districts of Timor-Leste were interviewed, 4,102 of which were aged between 12 and 18 years old. It is complemented with data from the Human Rights Violations Database (CAVR, 2006), containing 11,315 observations of human rights abuses and used to generate the indicator of conflict.

The empirical results, presented in section 5, confirm the significance of most of the theoretically established covariates of demand for secondary education. As variables such as returns to education and quality of schooling are, as the review below will show, negatively impacted by conflict, there is evidence that, through these channels, the experience of violence and conflict leads to lower demand for education. Yet, this study also shows that conflict has another significant effect on the household's preferences for secondary education. The evidence found suggests that adolescents who experienced a shock of extreme violence during their school years were more likely to attend secondary school five years after the end of the conflict than other, otherwise equal, adolescents that were spared. This result corresponds with the statements by parents interviewed and is object of reflection on last section of the study.

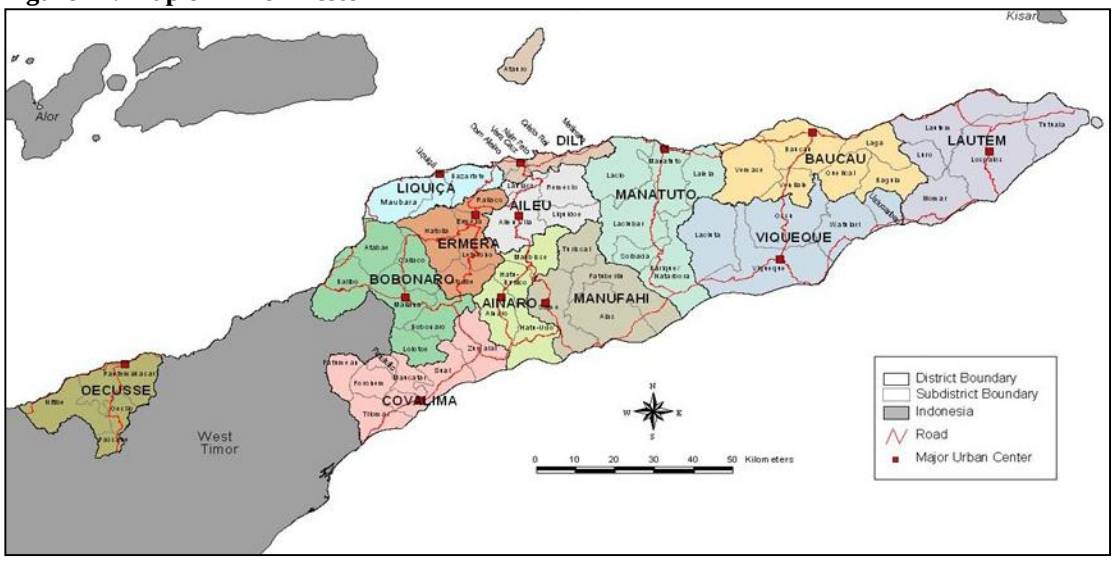
The chapter is structured as follows. A brief description of Timor-Leste and its conflict will set the background in section 1. In section 2, the conceptual framework will be presented, followed by the empirical strategy in section 3. After a brief presentation of the data used, the empirical results will be presented, in sections 4 and 5, respectively. A

synthesis and discussion of the results will conclude the study, opening the debate for future reflections and ways forward in the research.

1- Background

With a relatively small territory of 14,919 km2, Timor-Leste, henceforth referred as Timor, is a half-island neighbouring Indonesia by sea in the North, East and by land in the West, as well as Australia, by sea, in the South. With an estimated population of 1.2 million in 2012, this former Portuguese colony is the youngest Asian nation, as 2003 marked the end of foreign rule over the territory. Timor had, in fact, already declared independence from Portugal in November 28, 1975, but a week after Indonesia invaded and started a period of military occupation that would last until 1999.

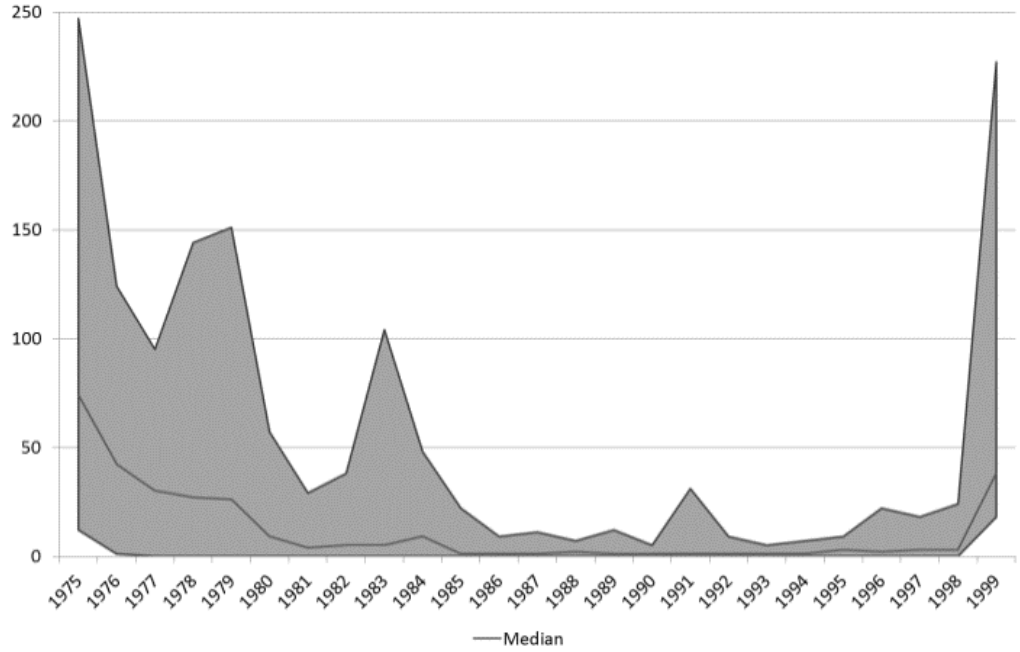
Figure 11: Map of Timor-Leste



Source: DNE (2008)

For 25 years, the people of Timor-Leste lived under a violent military occupation. At times and in some districts, the levels of violence reached extreme levels, particularly in the number of killings and disappearances perpetrated by the Indonesian army and pro-Indonesia Timorese militias supported by the occupying power. This is demonstrated in Figure 12, below.

Figure 12: Civilian killed and disappearances in each year (maximum, median and minimum)



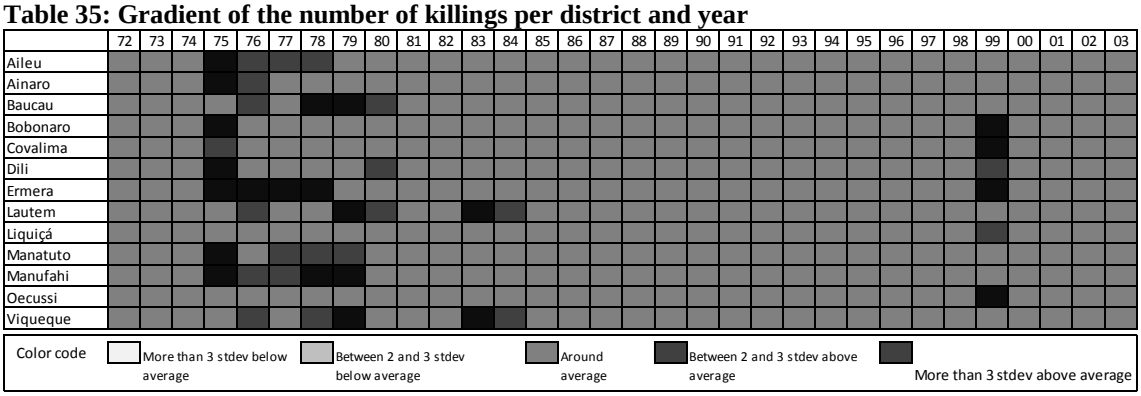
Source: Author's calculations based on CAVR (2006)

These events were thoroughly documented by the Timorese Truth and Reconciliation Commission in its dense and ample report of the history of events (CAVR, 2005) and a dataset of reported human rights abuses (CAVR, 2006). They were also documented in the historical research conducted by Taylor (1990, 1999), Gunn (1999) and Mattoso (2005) and the memoirs of those that lived through the process such as Felgueiras and Martins (2006) or Carrascalão (2012). A referendum in August 1999, when 78.5% of voters, from a turnout of 98.6%, voted for Timor's independence, ended the Indonesian occupation, which was not given up without a final bout of brutality. With the victory of the independence option, a brutal backlash ensued, reaching levels Timor had only witnessed in the period of invasion, as can be seen in Figure 12, above[79]. The scale of killings and disappearances was extremely high in some of the districts (see Table 35, below). While those living in the districts of Bobonaro, Covalima, Ermera and Oecussi

[79] The 1999 post-referendum violence took the form not only of killings but of significant property destruction, with scorched-earth practices and forced displacement, also reported in CAVR (2005). These effects were reported and surveyed in the 2001 Timor-Leste Living Standards Survey but, unfortunately, were not object of new enquiry in 2007. Meanwhile most of the population displaced is reported to have returned to their birth districts, as suggested in TLSLS (2007) and the 2010 census (National Statistics Directorate and UNFPA, 2011) and most of the reconstruction process reported to have taken place.

were the most affected, those living in Dili and Liquiçá also witnessed extremely high levels of violence in this period.

Table 35: Gradient of the number of killings per district and year



Source: Author's calculations using CAVR (2006) data

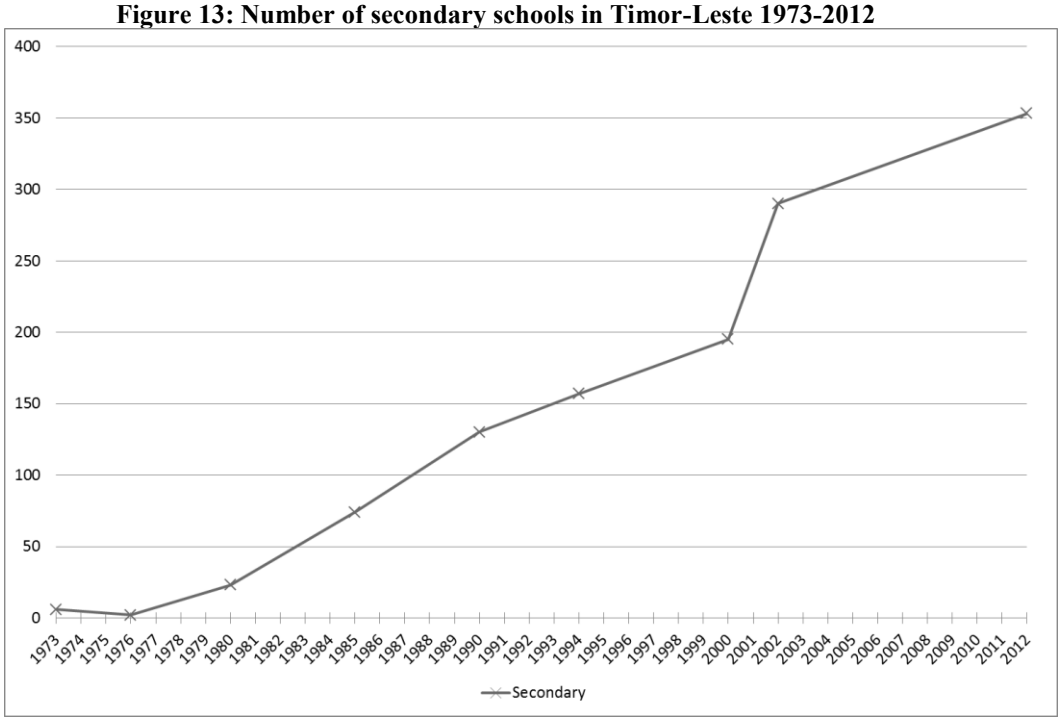
The experience of excessive killings and disappearances were accompanied by several other acts of violence, including forced displacement and the destruction of property and schools. An illustration of the events may come for the testimony of a Timorese interviewed is support of this study:

> *'Then in 1999 all went to dust, there was nothing. Indonesian military and autonomist militias vandalised schools, important buildings, houses of people, including our own (...). In that moment, at school no one had school uniforms, nothing. The important thing was that we had school. (...) Timorese came back from Indonesia, some were to get a Masters, some didn't finish their undergrad... patience! Some only had the secondary school, for instance. Those who knew how to teach could teach. In that moment, there were no criteria, like only graduates could teach secondary school, because of the emergency.'*
>
> Man from Laclubar (2012)

Yet, independence had finally been achieved and security was re-established by UN forces, led by Australia and with the support of the United States, Japan, Portugal and Brazil, among others. A period of transitory administration by the UN followed, from 1999 to 2002. This was a period of reconstruction and significant aid investment in many areas, including education, leading to a significant increase in the number of schools, particularly from 2003, as shown in Figure 13, below.

This expansion of school infrastructure was supported by the intervention of multilateral and bilateral donors, as highlighted by Nicolai (2004), namely the World Bank, Portugal, UNICEF, the World Food Programme, New Zealand, Brazil and Ireland. In fact, Nicolai (2004) states, the UN, in particular UNICEF, played the role of a *de facto* Ministry of Education. Recently, Australia also committed to support the Timorese education.

Figure 13: Number of secondary schools in Timor-Leste 1973-2012



Sources: INE (1974); BPS (1989, 1993); Saldanha (1994); GERTIL, (2003) and Ministry of Education (2012)

When the school year of 2004/05 started, five years had passed since the violent end of Indonesian occupation. The young post-conflict country was free from those violent events but suffered its legacies, which need to be accounted for when studying the demand for education.

This study, therefore, seeks to understand how the legacy of conflict affected demand for secondary education. A brief review of the conceptual framework supporting the analysis follows in the next section.

2- Conceptual Framework

An analysis of demand for secondary education in a post-conflict setting has to seek a dialogue between existing knowledge on demand for education on the one hand, and the microeconomics of conflict, particularly on the effects of conflict on decisions at the household level, on the other.

As a starting point, one should look at what may drive the decision to have an adolescent attend secondary school. Firstly there is, of course, the parents' own experience of education, and whether they attended school themselves. The household's decision is, however, framed but a wider set of drivers, as it is established by the theory and empirics of demand for education. Starting from the works of Mincer (1958), Schultz (1961), Becker, (1962) and Ben-Porath (1967), the economic analysis of demand for education constructs it as an investment done by the household, an investment in human capital. As with other investments, education is expected to generate a yield. In this case, it is expected to generate an education premium, a higher wage relative to comparably similar workers in comparable sectors and economies, for each added year of schooling (Becker, 1962). Higher returns to education provide a metric for this premium, an indicator that education pays as an investment (Becker, 1962; Mincer, 1974, 1958)[80]. It is, therefore, an expectation of positive and significant returns to education that constitutes the economic incentive for households' demand for the education of their members.

The economic analysis of demand for education acknowledges that, as an investment, a choice of having some of the household's members attend school is one where contemporaneous costs are assumed so that future gains can be attained. This has been clear since the seminal works of Becker (1962) or Ben-Porath (1967), but also

[80] However, it does not equate to a return on investment, as it does not relate the wage premium to the costs of education.

Wilkinson (1966), Heckman (1976), Lazear (1977) or Mattila (1982) and empirically confirmed in the empirical literature since then[81]. Education often requires a reduction in consumption of other goods, to support the acquisition of books, school material, school uniforms and other education related materials, and tuition fees when education is not free. These costs mean that household income is a key enabler of education demand. The financial burden can, of course, be assisted by external assistance, reducing the contemporaneous investment.

Education does not only cost money, it also requires time otherwise used for leisure, home care activities and labour. This means that the size and structure of the household[82] also matter, as well as the attribution of tasks in the household division of labour, which can depend of gender, age, marital status or other factors of intra-household status (to be the first child, to be adopted into the family, a niece or nephew of the household head, et cetera). Not only inside the household, but outside, investing time in education implies opportunity costs, such as wages that could be earned contemporaneously (as opposed to those that can be earned in the future). In that sense, the number of years of education already attained can have a dual effect, either as an enabler of progression, as it marks investment already done, or as a boundary above which the household's preferences switch to contemporaneous earnings. As the dimension of investment prevails throughout the decision process, access to credit and credit constraints are also important factors. Finally, a key dimension of the investment nature of demand for education is also the perceived quality of schools and teaching, as highlighted by Glewwe (2002).

[81] A thorough review of the seminal literature in demand for education can be found in Freeman (1987). A list of important examples of the economic literature on education can be found in Chapter 2.
[82] The importance of accounting for the structure of the household is highlighted by White and Masset (2003)

Among the drivers of demand here described, some may be affected by conflict. A first effect can be found in returns to education. Chamarbagwala and Morán (2011) suggest that conflict may induce decreased expectations of returns to education. Chapter 1 presents evidence that the experience of conflict did, in fact, reduce post-conflict returns to education in Timor. If post-conflict demand for secondary education is found to react to expected returns to education, this may be an evidence of an effect of conflict.

Another effect can be found through the household's income, if it proves, as theoretically expected, to be a significant driver of demand for education. Justino and Verwimp (2006) estimated that 20% of the Rwandan population moved into poverty as a consequence of the genocide. The genocide caused income reductions both directly and indirectly, via the destruction of productive assets and crops as found by Verwimp et al. (2010) or Bundervoet (2007). The destruction of assets, as Ibáñez and Moya (2009) highlight, can reduce the income generating capacity of households in such a way that forces them, in extreme cases, into a low-yielding livelihood strategy and into a poverty trap. This means, as Akbulut-Yuksel (2009) also points out, that asset destruction immediately reduces the household income and, therefore, the scope of non-income generating activities members of the household may engage in, including education. This was observed by Shemyakina (2011) who found a strong negative association between female enrolment in education and past damages to the household dwelling.

These impacts on the household's income generating capacities may have still persisted in the medium-run. While Badiuzzaman et al. (2011) allude to a "Phoenix" factor, a rapid economic recovery after extended conflicts, Cerra and Saxena (2008) point to a partial rebound after civil war, a recovery of half the loss in four years while the remainder takes more than a decade to recover. Macroeconomic data on Timor-Leste let

us know that, in 2004/05 the country's per capita GDP had still not recovered into its 1998 level (IMF, 2000; WDI, 2011). The assumption in this study is that, in 2004/05, the average Timorese household, and especially those more affected by the conflict, were still earning a lower income than they would have, had the conflict not occurred.

Another key dimension through which conflict may indirectly affect demand for education is related to the perceived quality of education and, in this case, of secondary education. Studies such as those by Lai and Thyne (2007) and Ichino and Winter-Ebmer (2004) assert the impacts of conflict on the quality of education through destroyed schools, disrupted access, or the migration and victimization of teachers. Swee (2009) found that, in Bosnia, the destruction of school buildings and educational facilities but also the migration of teachers resulted in reduced access to education, increasing its cost to the household while also reducing its efficacy. Concurrent with the final acts of violence, Timor experienced a significant reduction in the quality of schooling in the direct aftermath of its independence, with the repatriation of nearly two- thirds of its teaching body back to Indonesia[83]. This happened at the same time as a significant effort of school construction and reconstruction, as depicted in Figure 13 above. This reconstruction effort did increase the access to education but it will take longer to secure a full recovery in the quality of teaching through a good cadre of teachers – a concern which, in 2011, still guided the policy of the Government of Timor (Ministry of Education, 2011). If, empirically, the households show themselves as sensitive to perceptions of school quality when deciding on their adolescent's attendance of secondary school, then this can be understood as another channel of effect of conflict.

[83] This number was independently stated by two key informants, one working with the Timorese Ministry of Education and the other a former official of this Ministry (as interviewed in 2012). According to the Ministry of Education (2011:33-34), in 1996 only 65 of all third level basic education teachers were Timorese. These were the only ones that stayed after 1999 to provide for the education of what were then 21,810 students.

It is possible that the impact of conflict can induce differences in demand for secondary education among otherwise similar individuals, beyond the ones captured by the channels previously reviewed. Most of the studies on conflict and education suggest a negative impact[84]. FitzGerald, Stewart and Wang (2001) and Stewart and FitzGerald (2001) point out that school enrolments either decrease in conflict-afflicted countries or increase less in these countries than in others. Negative impacts were also found in Uganda (Blattman and Annan, 2010), Tajikistan (Shemyakina, 2011), Rwanda (Akresh and de Walque, 2008), and Bosnia (Swee, 2009). In Timor, Justino, Leone and Salardi (2013) analysed school attendance immediately after independence (2000/01) when Timor was still under UN transitional administration. They found significant evidence that exposure to displacement and house damage during the last bout of extreme violence in 1999 induced lower attendance in the first year of post-conflict. They also found evidence of mixed impacts of conflict on school attainment seven years after independence. In 2007, boys affected by conflict were less likely to have completed primary school, relative to girls.

The present study builds on this last contribution, seeking a deeper understanding of the medium-term impacts of conflict on educational outcomes through the use of a richer dataset. The goal is to deepen understanding of educational demand and achievement in post-conflict settings based on a careful analysis of a recent case study.

To achieve a deeper analysis of impacts of conflict, we must examine processes through which conflict may affect household preferences towards education. Through the many forms of violence that take place during a conflict, it imprints itself as an inducer of two dual psychosocial dimensions, trauma and resilience. Either or both of these dimensions

[84] Carlton-Ford and Boop (2010), Kondylis (2010) and de Groot and Göksel (2011) review some of these results.

can influence post-conflict preferences regarding education, with the combinations observed varying from individual to individual.

The United Nations' Report on the Impact of Armed Conflict on Children (Machel, 1996) stresses the first dimension, trauma. It suggests that psychosocial impacts are among the most significant impacts of conflict on children. Other key factors cited were threats to health (including higher prevalence of HIV-AIDS and malnutrition) and gender based exploitation and violence[85]. The emergence of post-traumatic stress due to conflict is highlighted by Dyregrov et al. (2002) and, in the specific case of Timor-Leste, by Silove et al. (2009). These effects on adolescents can shape their attitudes towards schooling and influence the household's decision on their attendance. Parents and other adults in the household can become fearful about the security of their children and adolescents. Research by Skonhoft, (2000) on Burundian Hutu refugees found that, given past experience of educated people being slaughtered for their ethnicity, many parents became reluctant to send their children to school even in refugee camps. These changes in households' perception can, as found in Burundi, have defining effects on demand for education.

Other effects found to result from an experience of violence and conflict were higher pessimism (Bozzoli et al., 2011) and greater sensitivity to uncertainty (Shemyakina, 2011). These effects can outlast the conflict and persist in the post-conflict setting (Silove et al., 2009), potentially leading to a reduced preference for education.

On the other hand, conflict can induce resilience in affected populations, as stressed by Blattman and Annan, (2010) or Bellows and Miguel (2009). The latter cite the studies by Tedeschi and Calhoun (1996) and Powell et al. (2003) to suggest that positive

[85] The relevance of malnutrition and food security in conflict and post-conflict settings is addressed in significant research by Breisinger et al. (2014), Calderone et al. (2014) or Maystadt et al. (2014).

changes in political agency and beliefs may arise from conflict, which can be construed as resilience effects. Where resilience effects dominate, surviving a conflict may produce a peace dividend in the form of positive aspirations, lower risk aversion and longer term perspective when evaluating alternative options of consumption, investment and livelihood. The decision to push for education against all odds suggested in the testimony by the Timorese quoted in section 1 suggests a prevalence of resilience effects in Timor. Resilience may also be fostered in the aftermath of conflict through reconstruction aid efforts targeting those areas and people worst affected. These resilience effects may include fostering gender equality, as found by Olsson (2009) in the case of Timor.

An empirical analysis of impacts of conflict and violence on post-conflict behaviours can only look at survivors, individuals that, for instance, lived through a time when the level of killings *of others* was more or less intense. Their experience can take various different forms. In the present study, the focus is on the experience of violence as an extreme shock (or succession of extreme shocks) experienced by school age individuals. As described above, the shock experienced in 1999 was one where extreme numbers of killings coincided with the destruction of schools and forced displacement of communities. The Timorese were able to partially recover from such forms of violence, with help from the reconstruction of schools and the return of most of those displaced. Yet legacies may have remained, namely in the form of preferences regarding education.

Arguably, the experience of a shock of extreme violence is more likely to lead to trauma than to resilience. When experienced during school age, this shock affects the education experience due to significant disruptions, both immediately and through any coping or emergency measures needed to face it, as described in section 1. When experienced at

school age, such shocks can induce trauma and reduced demand for schooling, as thoroughly documented in CAVR (2005).

Yet in some cases resilience effects can be strong enough to overcome the trauma induced by these shocks, as suggested by Bellows and Miguel (2009). In these cases, one should expect positive reactions to the experience of conflict will prevail in post-conflict situations, namely, in the case of this study, through the choice that adolescents make to attend secondary education.

Qualitative research conducted in Timor in 2012 based on life story interviews with Timorese in regions differently affected by the conflict[86] suggests that resilience effects may have prevailed in Timor.

An example of positive aspirations regarding education comes from the words of a mother from the subdistrict of Bazartete, in the Western district of Liquiçá:

> *'My dream for the future of my children is education, because it is important. When their mother and father no longer have strength, my children need to be educated to be PhDs, according to their own wishes. If they can get a scholarship and go to [South] Korea that is also important.'*
>
> *Woman from Bazartete (2012)*

The suggestion is, therefore, that resilience effects could be influencing the decisions of Timorese vis-a-vis education as a medium-run impact of conflict. At this level, Timor may be showing a peace dividend.

Several key covariates of demand for secondary education in a post-conflict setting may be distinguished. Among them, some are possible channels of impact of conflict on demand for education. The overall impact of conflict may extend beyond these channels and eventually also be perceived as shifts in the preferences themselves.

[86] A total of 24 life stories interviews were conducted in three sites: Bazartete in the district of Liquiça, in the West; Laclubar in the district of Manatuto, in the Centre; Lautem in the district of the same name, in the East.

Building on this discussion, the following section presents the empirical strategy used to assess medium-run impacts of conflict on post-conflict demand for secondary education.

3- Empirical Strategy

Building on the previous discussion, this study seeks to provide a deeper understanding of post-conflict demand for secondary education and to empirically assess the possibility of identifying inferable medium-run impacts of conflict on demand for secondary education. It will do this by looking into the households' decision to have their adolescents aged 12 to 18 years old attending secondary school.

As this is a binomial choice, this study applies a Probit regression, as used in studies such as Justino et al. (2013), Deng et al. (2014) or Attanasio and Kaufmann (2014). Let, therefore, Y_1^* be a latent variable that linearly expresses the probability of attending school, i.e.:

$$Y_1^* = \alpha + Conf * \beta^c + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + \varepsilon_1 \ (1)$$

As it is only possible to observe whether each adolescent attends school or not, y_{1i}, it is assumed that:

$$y_{1i} = \begin{cases} 0 \ if \ y_1^* \leq 0 \\ 1 \ if \ y_1^* > 0 \end{cases}$$

with $Conf$ being the indicator of violence experienced during the conflict, X_1, X_2 and X_3 being vectors with other variables theoretically established as determinants of the choice of attendance and $\varepsilon_1 \sim N(0, \sigma_1^2)$.

Each vector of covariates of demand for secondary education express particular components of the interaction between characteristics intrinsic to the adolescent, her

household or their place of residence and other socio-economic factors that theoretically and empirically were established to correlate with attendance to school.

X_1 encompasses a set of individual, household and local specific covariates that, as discussed in section 2, may affect demand for secondary education: *gender* (1 if female); *age*; *age*^{2}; binomial indicator that the adolescent's household resides in an *urban* or rural area (1 if urban); binomial indicator that the adolescent's *father attended school*; binomial indicator that the adolescent's *mother attended school*[87]; binomial indicator that the adolescent *migrated*; binomial indicator that the adolescent is the *first child*; binomial indicator that the adolescent *is adopted*; binomial indicator that the adolescent is a *niece/nephew* of the household head; binomial indicator that the adolescent is *married*; *ln (number of household members)*; and the share of each of the following cohorts in the household: *boys aged 0-1*, *2-4*, *5-9*, *10-14* and *men aged above 65*; girls aged *0-1*, *2-4*, *5-9*, *10-14* and *women aged above 65*.

As referred in section 2, the size and constitution of the household allow for a proxy of the intra-household division of labour, particularly in what regards hours of care activities the adolescent is involved in. Although the TLSLS (2007) provides information on reported hours of care work, its addition to the empirical model would impose on it endogenous effects. As discussed in section 2, the theory of education demand, sets the choice of education to be concurrent with the choices of time use for work and care. While a possible empirical approach to such economic problem of the household would be a multinomial probability regression on the three alternative time uses, the stochastic nature of the empirical problem this study seeks to address

[87] Preferably, this study would use information on the years of education of each of the parents. However, the TLSLS 2007 only reports data on education of 1,113 fathers of the 4,102 adolescents aged between 12 and 18 (with an average of 1.13 years of education) and 845 mothers (with an average of 0.8 years of education). It provides, however, a full indication of whether the parents attended school. Therefore, the study uses this as an indication of the level of parent's education.

recommended a linear probability analysis to be adopted. To account for the drivers of choice for care work, and in part also those of outside work, the household size (in logarithm) and composition, not endogenous to school attendance, were therefore integrated in the empirical model.

X_2 is a vector of covariates that express the nature of education as an investment: *completed years of education* (as an indicator of human capital already accumulated by the adolescent); *estimated returns to education* (calculated estimates of the model used in the analysis of post-conflict returns to education in Timor, in Chapter 1, with the same datasets used in this study); *average wage at the cluster level* (as an indicator of the opportunity cost of education); *number of cows* (as a proxy for credit worthiness, significant because in 2005 bancarization had not yet occurred in Timor and because cows are still a very important component of dowry in the country); *binomial variable on whether the household had been denied credit* (an indicator of access to credit).

The use of the average wage at the cluster level as an indicator of the opportunity costs of education follows the rationale presented before regarding the concurrent decision on use of time, in this case between education and work outside of the household. Again, the use of an indicator of occupation would introduce endogeneity into the empirical model.

The indicators of credit worthiness and access to credit seek to proxy for the potential cost of credit and credit constraints faced by the household, so as to address the inter-temporal optimization rationale inherent to the decision on education.[88]

[88] A calculated average rate of interest for credit received by the households at a cluster level was considered in early empirical analysis. However, due to the low bancarization of the country, a significant proportion of the households and clusters did not report loans received or interest rates.

X_3 is a vector of covariates that incorporates the dimensions of education as an economic good that is consumed: current *household per capita income*; *average per capita private expenditure in education at the cluster level*; *average distance to secondary school at the cluster level* (as proxies of direct costs of education); *average external financing to education at the cluster level* (as a proxy of potential support for education available to the household); and percentage of school drop-outs attributed to *insufficient quality*, to *insufficient access* and to *insecurity* in the district of birth (as indicators of the perception of school quality). This latter regression will be used for further tests of robustness and sample decomposition analyses.[89]

Lack of reliable information on income at the household level required the search for a proxy variable. A first possible solution would be to use household expenditure as a proxy. However household expenditure is endogenous on all resource generating time uses and, likewise, of substitute ones. Therefore, there is a strong suspicion of endogeneity with the decision of attendance to secondary school by the adolescent. To overcome this limitation, an instrumental variable approach is adopted and tested. The *household per capita income*, as a proxy of *per capita expenditure* is, therefore estimated using the remaining variables in the empirical model and the following instruments, representative of productive assets and wealth: years of education of the household head, controls for type of dwelling owned (bamboo house, semi-permanent, traditional house, small house in compound of main house, permanent house, emergency/tent, other), area of owned plot, value of owned plot, area of plots partly owned, variables indicative of the number of units of livestock owned (buffalos, bali cows, horses, pigs, goats, sheep, chicken or ducks) and total value of the livestock[90]. For each relevant regression, joint significance of the instruments is used to test for eventual

[89] A full description of the variables is in Table 59.
[90] Regressions not shown.

weak instruments. In all of them, the instruments were found significant by the Sargan test. Endogeneity was also tested, following the procedure presented in Wooldridge (2010:587). If exogeneity cannot be rejected, the household per capita expenditure is used as a proxy of the household's income. If endogeneity is found to exist, the estimate from the instruments regression is used.

Seeking to assess possible inference of impact of conflict on the demand for secondary education, the following proxy of the violence experienced during the Timorese conflict is used: $Conf$ = *Shock of extreme violence during the school life of the adolescent*, a binomial variable that indicates whether extreme levels of violence manifested themselves at the district of birth of the adolescent and during the time she was of school age. The attribution to each adolescent of the experience of an extreme shock follows the procedure applied by Justino et al. (2013). The attribution is made if, in any year of her life, the level of killings and disappearances in her district of birth exceeded the mean for all years and districts by two standard deviations or more. In their study, as in Chapter 1, a count of the number of years when such threshold is passed is done. In this study, as it can be perceived in Figure 12 and Table 35 above, during the school age of adolescents born between 1986 and 1992 and of school age from 1992 onwards (the oldest), only one event of extreme violence, the 1999 post-referendum brutal backlash by the Indonesian military and affiliate militias, occurred at the school age of the sampled adolescents.

The analysis of demand for secondary education introduces another caveat. Contrary to attendance to primary education, analysed in the Timorese post-conflict setting in Chapter 2, access to secondary education is only open to those that complete primary education. There is, therefore, a possible selection bias. The empirical analysis in this

study will, therefore, use a bivariate binomial regression with sample selection, also known as an Heckman Probit (HP), first developed by Van de Ven and Van Praag (1983, 1981) and applied in various studies, including Greene (1998), or Neal (1995), Montmarquette et al. (2001), Grootaert and Patrinos (2002), Riphahn and Schieferdecker (2012), Gaeta (2013) and Rubb (2014), specifically related to choices regarding education. Riphahn and Schieferdecker (2012) tested and found that the empirical analysis of the decision to transit into tertiary education has to account for selection bias as only those that succeed in passing qualifying exams are entitled to enrol in tertiary school. Their approach approximates the conditions that inform the analysis of demand for secondary education, as is conducted in this study.

Let, therefore Y_2^* be a latent variable that linearly expresses the probability of having completed primary school.

$$Y_2^* = Z\gamma + \varepsilon_2 \ (2)$$

with Z being the following set of covariates: *gender*, *age*, *age*^{2}, *urban*, *father attended school*, *mother attended school*, *migrated*, *first child*, *adopted*, *niece/nephew*, *married*, *ln (number of household members)*; shares of *boys aged 0-1*, *2-4*, *5-9*, *10-14* and *men aged above 65*; shares of girls aged *0-1*, *2-4*, *5-9*, *10-14* and *women aged above 65*, *completed years of education*, *estimated returns to education*, *average wage at the cluster level*, *number of cows*, *binomial variable on whether the household had been denied credit*, *household per capita income*, *average expenditure in education at the cluster level*, *average distance to primary school at the cluster level*, *average external financing to education at the cluster level*, *insufficient quality*, *insufficient access* and *insecurity* in the district of birth and the conflict indicator *shock of extreme violence during the school life of the adolescent*. As completeness of primary education is likely

to be dependent of the distance to the nearest primary school and not to the secondary school, this covariate operates as an instrument in the first stage selection equation. All variables, for both selection and main models are described in Table 57, in the appendix. It is assumed that $\varepsilon_2 \sim N(0, \sigma_2^2)$.

As it is only possible to observe whether the secondary school aged member of the household completed primary school or not, y_{2i}, it is assumed that:

$$y_{2i} = \begin{cases} 0 \; if \; y_2^* \leq 0 \\ 1 \; if \; y_2^* > 0 \end{cases}$$

Under conditions, to be tested, of evident selection bias, $corr(\varepsilon_1, \varepsilon_2) = \rho \neq 0$, which is equivalent to have $(\varepsilon_1, \varepsilon_2) \sim N(0,0, \sigma_1^2, \sigma_2^2, \rho)$, a bivariate normal distribution.

While the chosen covariates of the demand for secondary education may be able to address perceived risks of endogeneity, there are reasonable expectations that the indicators of conflict may not. A common cause of endogeneity of conflict is reverse causality. In this case, a reverse causality between attendance to school (measured in 2004/05) and the conflict indicator (reporting to the period 1975 to 1999) is not likely to occur. However, one cannot overlook reasonable expectations of omitted variable bias or correlated measurement error. In the conflict literature, one can find evidence of endogeneity of conflict due to factors such as income and victimization of richer individuals and more educated individuals, as per Justino and Verwimp (2006). The empirical strategy adopted in this study, exploring intensively many likely covariates of demand for education may reduce the scope of omitted variables. To strengthen this possibility, all regressions also include district and ethno-linguistic control variables. It may, however, not encompass all possibilities. A possible omitted variable bias regarding the indicator of violence during the conflict, the indicator of a *shock of*

extreme violence during the school life of the adolescent, is the degree of socio-economic linkages between the populations in the districts of Timor and the neighbouring western half of the island, part of Indonesia. In the districts with more linkages, it would be more likely for a higher proportion of the population to be sympathetic to a stronger integration of the two parts of the island. While a border was created in 1859 under a treaty between the then colonial powers of Portugal and Netherlands, Bowden and Hajek (2007) and Soares (2003) show that a commonality of language exists between the different Timorese peoples across these borders. This commonality predates Indonesian occupation and may have promoted a higher allegiance to a project of integration among the peoples closer to the border. This may have propitiated for two characteristics to positively correlate: attendance to Indonesian education and formation of pro-Indonesia groups. The first effect, during the 25 years of occupation could have led to relatively more educated parents and a higher preference for the education of their adolescents. The second effect would lead to higher likelihood of militia formation and higher levels of violence in the post-referendum events. Among these events was a massive displacement of Timorese to Indonesian West Timor, from which most but not all Timorese returned after independence (CAVR, 2005). If those that stayed in West Timor were more committed to Indonesia (including being afraid of reprisals from violent acts perpetrated in 1999), they would also be more likely to have their adolescents in school prior to the violent events that correlated with regime and sovereignty change in Timor. All other effects remaining unchanged, this would lead to a lowering in preferences to school in post-conflict at a district level due to an unobserved shift in the prevalent characteristics of people residing in those districts. If that is the case then, without correction, there could be an over-estimation of negative impacts of conflict on the choice of having adolescents attend secondary school.

To address this possible source of time-variant endogeneity, an IV approach was applied, using the distance to the western border of Timor-Leste with Indonesia as an instrument. This strategy made use of the fact that the Indonesian operations' logistics were systematically supported through their western half of the island of Timor, as per CAVR (2005). This allowed for stronger control but also more violence to be enacted by Indonesia in the western districts of Timor-Leste. The forms of severe violence were also enabled by this logistical feature, again as reported in CAVR (2005), particularly in the case of the destruction enacted in the post-referendum, with violence at a higher scale closer to the border, where pro-Indonesia militias received more support and were better armed. Therefore and as it was described in historical reports, namely Taylor (1990; 1999) and CAVR (2005), the distance to the border is expected to be correlated with the indicator of conflict used. Meanwhile, an observation of the most developed centres of Timor-Leste, the capital Dili, closer to the west, Baucau and Lospalos, in eastern districts and, finally, Maliana, near the western border, suggest that the Timorese post-conflict demand for education is not correlated with the distance to the border, allowing it to be a possible instrument. This intuition is confirmed by the descriptive statistics analysis performed as no significant correlation was found between the explained variable, attendance to secondary education, and distance to the border.

The empirical model is, therefore, estimated using Probit, IV Probit and Heckman IV Probit regressions. As it is likely that more than one adolescent of secondary school age resided in the same household, the variance-covariance matrixes were clustered by household. As mentioned before the regressions were run with district and ethno-linguistic controls.[91]

[91] Empirical estimation is done using the STATA 13 SE software package.

4- Data Description

This study uses the dataset of the Timor-Leste Survey of Living Standards of 2007 (TLSLS, 2007), conducted by the Timorese National Directorate of Statistics (DNE), with the support of the World Bank and UNICEF. A representative set of 4,470 households was interviewed, with 25,000 people surveyed, from all districts of Timor-Leste, of which 4,102 are aged between 12 and 18 years old.

The study uses a second dataset, the Human Rights Violations Database (CAVR, 2006), containing 11,315 observations of human rights abuses to generate the indicators of conflict. The observations were collected from narrative statements of deponents to the Timorese Truth and Reconciliation Commission (CAVR), qualitative reports from Amnesty International and data collected by the Timorese NGO FOKUPERS. Under the CAVR mandate, Benetech-HRDAG produced and presented calculations of human rights violations in Timor-Leste in support of the commission's final report entitled "Chega!" (CAVR, 2005).

Table 36: School attendance in 2004-05 per age (6 to 18 year olds) and gender (percentages)

Age	6	7	8	9	10	11	12	13	14	15	16	17	18
Female													
Prim.	6.6	25.8	49.7	72.4	81.4	80.3	81.8	73.4	59.4	47.2	32.6	15.8	15.4
Sec.	-	-	-	-	-	-	2.9	10.5	25.3	35.4	46.9	57.7	51.4
Male													
Prim.	8.0	24.0	49.4	71.6	76.8	83.3	81.4	78.6	68.6	51.3	44.6	24.2	20.9
Sec.	-	-	-	-	-	-	2.7	8.4	18.2	28.1	37.3	50.0	48.9
All													
Prim.	7.3	24.9	49.6	72.0	79.1	81.8	81.6	76.1	63.9	49.3	39.0	20.3	18.1
Sec.	-	-	-	-	-	-	2.8	9.4	21.8	31.7	41.7	53.6	50.2

Source: author's calculations using TLSLS (2007)

In Table 36, above, it is possible to notice some relevant characteristics of Timorese school attendance in the post-conflict school year of 2004-05. A first indication is of a late entry in school, with seeming detrimental impacts on entrance in secondary school. Notably, the age at which higher primary school enrolment is observed, 11 years old with 81.6% enrolled, is just one year shy of the age at which someone starting school at

the regular age of 6 and without repeating would begin secondary school. Consequently, only close to 3% of 12 year olds start secondary school and peak enrolment rate, at the age of 17, is only slightly above 50%. At the age of 18, nearly half the population is either seriously lagging behind, (even more so) still in primary education, or is already out of school. The significant reduction in attendance, after its maximum values, suggests a relatively small schooling attainment amongst young Timorese. The average school attainment of an 18 year old Timorese was approximately 6 years in 2004-05.

Table 37: Secondary attendance in 2004-05 (age 12 to 18) by district and type of residence

District	Rural	Urban	Total
Aileu	14%	.	14%
Ainaro	23%	31%	27%
Baucau	*24%*	*43%*	*29%*
Bobonaro	*17%*	*43%*	*26%*
Cova Lima	*36%*	*40%*	*38%*
Dili	44%	48%	48%
Ermera	*11%*	*29%*	*12%*
Lautem	29%	34%	32%
Liquica	13%	14%	13%
Manufahi	*34%*	*50%*	*42%*
Manatuto	29%	31%	29%
Oecussi	*11%*	*27%*	*20%*
Viqueque	*18%*	*44%*	*28%*
Total	*20%*	*39%*	*29%*

Source: author's calculations using TLSLS (2007)

Also noticeable is the great similitude in attendance rates amongst boys and girls with the very small difference found not to be statistically significant[92]. Table 37, above, reveals a very low secondary school attendance rate in Timor-Leste, below 30%. It also reveals significant regional differences in secondary school attendance. Nationwide and in half of the Timorese districts (highlighted) school attendance is also significantly different, depending on the typology of residence[93].

[92] A battery of t-tests on the difference of attendance for each age did not reject the null hypothesis of no difference in any of the cases.

[93] T-tests performed reject the hypothesis of equal average school attendance in rural and urban households of the districts mentioned.

Table 38: Secondary school attendance in 2004-05 by ethno-linguistic group and gender (age 12 to 18)

Ethno-linguistic group	Male	Female	Total
Tetum	42%	53%	48%
Baequeno	17%	23%	20%
Bunak	30%	33%	31%
Fatalucu	30%	36%	33%
Galolen	31%	32%	32%
Kaklun bi	.	100%	100%
Kemak	14%	26%	21%
Laklei	33%	31%	32%
Macalero	33%	42%	37%
Macasae	26%	32%	29%
Mangilih	50%	.	50%
Mambae	23%	23%	23%
Midiki	24%	21%	23%
Naueti	31%	19%	24%
Sa ani	17%	14%	15%
Tetum ter	32%	35%	33%
Tokodete	16%	11%	14%
Uaimua	35%	30%	32%
Bahasa In	29%	20%	25%
Portugues	100%	.	100%
Inggris	0%	100%	50%
Other	28%	22%	25%
Total	27%	32%	29%

Source: author's calculations using TLSLS (2007)

A review of Table 38, above, reveals some significant differences in secondary school attendance between ethno-linguistic groups. It is important to notice that most of these differences correlate with the geographic diversity shown is the previous table, as most ethno-linguistic groups reside in one district alone. Among Tetum and Kemak speakers, average secondary school attendance of young women is statistically higher than of young men. In the remaining ethno-linguistic groups, gender differences are not statistically significant.

As referred to in section 3, above, geographic and ethno-linguistic controls are used in the empirical strategy, to account for intrinsic differences as the ones suggested here.

An analysis of the indicator of conflict used, in Table 39, below, shows that there is not much heterogeneity attributable to gender differences or type of residence: close to 21

percent of the adolescents lived through a shock of extreme violence during the time of the conflict and while they were already of school age.

Table 39: Conflict indicators by gender and type of residence

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2001	N=2101	N=2049	N=2053	N=4102
Shock of extreme violence during school	21.9% (41.4%)	21.0% (40.8%)	21.1% (40.8%)	21.8% (41.3%)	21.5% (41.1%)

Source: author's calculations using TLSLS (2007)

As expected, Table 40 below shows that school attendance is higher in urban areas. Interestingly, it is also higher among girls, a difference that is statistically significant. Other noticeable differences are the higher prevalence of migrants and of adolescents residing in households headed by an aunt or an uncle in urban areas while the percentage of married adolescents is slightly higher in rural areas. Other than in attendance, no significant differences are noticeable between girls and boys.

Table 40: School attendance, individual, household and local level indicators

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2001	N=2101	N=2049	N=2053	N=4102
Attending School in 2004/05	32.0% (46.7%)	27.1% (44.4%)	38.7% (48.7%)	20.3% (40.2%)	29.5% (45.6%)
Female	- -	- -	48.4% (50.0%)	49.1% (50.0%)	48.8% (50.0%)
Urban	50% (50.0%)	50% (50.0%)	- -	- -	50% (50.0%)
Age	15 (2)	15 (2)	15 (2)	15 (2)	15 (2)
Father Attended School	4.9% (21.6%)	4.7% (21.2%)	6.7% (25.0%)	2.9% (16.8%)	4.8% (21.4%)
Mother Attended School	2.2% (14.8%)	2.6% (16.0%)	3.4% (18.0%)	1.5% (12.2%)	2.4% (15.4%)
Migrated	5.2% (22.3%)	5.0% (21.9%)	8.7% (28.2%)	1.6% (12.6%)	5.1% (22.1%)
First child	24.9% (43.3%)	26.0% (43.9%)	21.3% (41.0%)	29.6% (45.7%)	25.5% (43.6%)
Adopted	1.9% (13.8%)	2.0% (14.2%)	2.0% (13.8%)	2.0% (14.2%)	2.0% (14.0%)
Niece/Nephew	7.5% (26.4%)	6.5% (24.6%)	10.2% (30.3%)	3.8% (19.0%)	7.0% (25.5%)
Married	1.8% (13.5%)	0.1% (3.1%)	0.7% (8.5%)	1.2% (10.8%)	1.0% (9.7%)
Household Size	7.3 (2.6)	7.3 (2.4)	7.6 (2.6)	6.9 (2.4)	7.3 (2.5)

Source: author's calculations using TLSLS (2007)

An analysis of the indicators of education as an investment, in Table 41 shows that, on average, Timorese adolescents aged between 12 and 18 had completed only the first four years of basic education, with some advantage to urban residents. Expected returns to education are significantly low, much as the opportunity costs. The average local hourly wage potentially known to adolescents in urban areas is significantly higher than the one an average rural adolescent would expect on average to attain. The households own close to one cow and only very few had a loan denied.

Table 41: Indicators of education as an investment

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2001	N=2101	N=2049	N=2053	N=4102
Completed Years of Education	4 (3)	4 (3)	5 (3)	3 (3)	4 (3)
E(Returns to Education)	0.63% (1.1%)	0.56% (1.3%)	0.57% (1.2%)	0.62% (1.3%)	0.59% (1.2%)
Average Local hourly wage	0.06 (0.18)	0.06 (0.19)	0.09 (0.23)	0.02 (0.10)	0.06 (0.18)
Number of cows owned	1.0 (3.7)	1.0 (4.9)	1.0 (4.7)	1.1 (4.0)	1.0 (4.4)
Household had loan denied	2% (15%)	2% (14%)	2% (14%)	2% (14%)	2% (14%)

Source: author's calculations using TLSLS (2007)

The analysis of Table 42, below, again reveals some heterogeneity between urban and rural areas. Urban households have, on average, higher income, face higher education costs, have access to more external financial support and their adolescents take less time to reach school. Perceptions of school quality also differ between urban and rural dwellers: in rural areas perceptions of insufficient quality, access and insecurity are significantly more prevalent than in urban areas. On the other hand, there are no significant differences in the average values of the indicators for girls and boys.

Table 42: Indicators of education as a consumption good

	Gender		Urban / Rural		All
	Girls	Boys	Urban	Rural	
Variable	N=2001	N=2101	N=2049	N=2053	N=4102
Per capita Monthly Household Income	25.4 (31.2)	24.4 (30.2)	29.3 (41.7)	20.5 (10.5)	24.9 (30.7)
Average local education costs (monthly)	27.1 (18.9)	26.7 (17.7)	33.5 (21.4)	20.2 (11.2)	26.9 (18.3)
Average local subsidies to education	1.7 (3.9)	1.6 (4.1)	2.3 (4.5)	1.0 (3.2)	1.6 (4.0)
Average local time to secondary school (in minutes)	28.8 (17.6)	28.4 (16.5)	23.0 (11.7)	34.1 (19.6)	28.6 (17.1)
Insufficient Quality	2.2% (2.3%)	2.2% (2.3%)	1.6% (1.5%)	2.8% (2.8%)	2.2% (2.3%)
Insufficient Access	6.4% (3.6%)	6.3% (3.6%)	5.0% (2.8%)	7.6% (3.9%)	6.3% (3.6%)
Insufficient Security	0.8% (1.3%)	0.8% (1.3%)	0.6% (0.8%)	1.0% (1.6%)	0.8% (1.3%)

Source: author's calculations using TLSLS (2007)

As a first approximation to the analysis of medium-run impacts of conflict on school attendance, in Table 43, below, it is possible to compare the average probability of attendance and the average values of the covariates described in section 3, depending on whether the household experienced the shock of extreme violence or not. There is a statistically significant indication that those adolescents that witnessed extreme levels of violence during the conflict and while they were of school age are more likely to have attended secondary school in 2004/05. Other differences found are: higher likelihood of an adolescent that witnessed a shock of extreme violence to live with uncles of aunts; lower expected returns to education, which appear to be negative, on average, for those that experienced extreme levels of conflict; higher ownership of financial collateral and better access to credit (on average) of households that witnessed a shock of extreme violence during the life of the adolescent.

This brief analysis of the variables in this study shows some significant dimensions of heterogeneity between boys and girls, between urban and rural areas, and also within the groups. This suggests the interest in analysing demand for secondary education also for the subsamples of boys and girls and urban and rural dwellers. It also reveals the need to account for district and ethno-linguistic fixed effects. Some indication exists of

a higher preference for education of those that experienced higher levels of violence during the conflict, as the qualitative references collected also suggested.

In the next section, these suggestions will be tested.

Table 43: Descriptive statistics on the experience of extreme conflict

	Experienced Extreme Violence		All
	Yes	No	
Variable	880	3222	4102
Attending School in 2004/05	39.5%	26.7%	29.5%
	(48.9%)	(44.3%)	(45.6%)
Female	50%	49%	49%
	(50.0%)	(50.0%)	(50.0%)
Age	16	15	15
	(1)	(2)	(2)
Urban	49%	50%	50%
	(50.0%)	(50.0%)	(50.0%)
Father Attended School	5.1%	4.7%	4.8%
	(22.0%)	(21.2%)	(21.4%)
Mother Attended School	2.8%	2.3%	2.4%
	(16.6%)	(15.1%)	(15.4%)
Migrated	6.4%	4.8%	5.1%
	(24.4%)	(21.4%)	(22.1%)
First child	26.8%	25.1%	25.5%
	(44.3%)	(43.4%)	(43.6%)
Adopted	1.5%	2.1%	2.0%
	(12.1%)	(14.5%)	(14.0%)
Niece/Nephew	10.3%	6.1%	7.0%
	(30.5%)	(23.9%)	(25.5%)
Household Size	6.9	7.4	7.3
	(2.5)	(2.5)	(2.5)
Completed Years of Education	5	4	4
	2	3	3
E(Returns to Education)	-1.23%	1.09%	0.59%
	(1.53%)	(0.42%)	(1.25%)
Average Local hourly wage	0.09	0.05	0.06
	(0.3)	(0.1)	(0.2)
Number of cows owned	2.2	0.7	1.0
	(7.0)	(3.2)	(4.4)
Household had loan denied	1%	2%	2%
	(8.2%)	(15.6%)	(14.3%)
Per capita Monthly Household Income	25.9	24.6	24.9
	(14.7)	(33.8)	(30.7)
Average local education costs (monthly)	23.7	27.7	26.9
	(14.1)	(19.2)	(18.3)
Average local subsidies to education	0.9	1.8	1.6
	(1.7)	(4.4)	(4.0)
Insufficient Quality	1.8%	2.4%	2.2%
	(1.1%)	(2.5%)	(2.3%)
Insufficient Access	7.3%	6.0%	6.3%
	(3.6%)	(3.6%)	(3.6%)
Insufficient Security	1.0%	0.8%	0.8%
	(1.8%)	(1.1%)	(1.3%)

Source: author's calculations using TLSLS (2007)

5- Results

The starting point of the empirical analysis of secondary school demand will take us to test the possibility of selection bias, as discussed in section 3. As also discussed there,

tests of endogeneity of the conflict indicator and of the household income were performed to establish if an IV approach should be adopted regarding the respective regressors, both in a linear probability regression (Probit or IV Probit) or in a bivariate binomial regression with sample selection (Heckman Probit or Heckman IV Probit). In both cases, the instruments discussed in section 3 were proven to be significant under the Sargan test. Exogeneity was rejected for the conflict indicator in all cases, following the test procedure presented in Wooldridge (2010:587), and therefore, the respective IV estimates were used. It was also rejected for the proxy of household income in the first stage model of the bivariate binomial regression with sample selection and again the IV estimates were used. In the estimations of the models of demand for secondary education, both in the second stage of the Heckman Probit and in the linear probability regressions, exogeneity of the proxy of household income could not be rejected following the test procedure presented in Wooldridge (2010:587). Therefore, in these cases, the proxy of household income discussed in section 3 was used.

Table 44: Secondary Education Demand - Heckman Probit Regression - First Stage

	(1st Stage) Heckman IV Probit b/se
Explained variable = Probability of adolescent, between ages 12 and 18, to have completed primary school before the 2004/05 school year	
Constant	-19.183***
	(2.693)
Conflict: Shock of extreme violence during school life	**2.327*** **
	(0.272)
Female	0.040
	(0.061)
Age	2.072***
	(0.321)
Age^2	-0.055***
	(0.010)
Urban	-0.221*
	(0.130)
Father attended school	-0.081
	(0.171)
Mother attended school	-0.273
	(0.230)
Migrated	-0.189
	(0.189)
First child	0.031
	(0.083)
Adopted	-0.194
	(0.238)
Niece/Nephew	-0.003
	(0.154)

Table 44: Secondary Education Demand - Heckman Probit Regression - First Stage (cont.)

	(1st Stage) Heckman IV Probit b/se
Explained variable = Probability of adolescent, between ages 12 and 18, to have completed primary school before the 2004/05 school year	
Married	-0.094
	(0.373)
Ln (Household Size)	0.187
	(0.123)
Share of boys 0-1	-0.614
	(0.977)
Share of boys 2-4	0.394
	(0.586)
Share of boys 5-9	0.600
	(0.440)
Share of boys 10-14	0.047
	(0.379)
Share of men above 65	-0.413
	(0.589)
Share of girls 0-1	-0.614
	(0.777)
Share of girls 2-4	0.100
	(0.637)
Share of girls 5-9	0.105
	(0.495)
Share of girls 10-14	0.572
	(0.387)
Share of women above 65	-0.248
	(0.705)
E(Returns to Education)	66.600***
	(9.599)
Average local wage	-0.237
	(0.198)
Number of cows owned	-0.004
	(0.007)
Loan was denied	-0.125
	(0.304)
E (Per capita Monthly Household Income)	0.034***
	(0.009)
Average local education costs	-0.000
	(0.003)
Average local subsidies to education	0.025**
	(0.012)
Average time to primary school	-0.007**
	(0.003)
Insufficient Access	-3.471*
	(2.034)
Insufficient Quality	-33.641***
	(11.988)
Insufficient Security	-10.816
	(14.788)
N	4091
N – uncensored	1396
Pseudo R^2	-
Log-likelihood	-84604.710
Exogeneity test (H_0: athrho=0)	
χ^2 c	1.640
p-value	(0.200)

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Table 44 (above) presents the empirical estimates of the proposed selection model: the first stage of the proposed Heckman Probit approach. The likelihood of having completed primary school education for an adolescent aged between 12 and 18 years old correlates significantly and positively with the experience of a shock of extreme

violence during school. It is also significantly correlated with a set of correlates of demand for education, among those discussed in section 2: *age* (positively, with a second order correction effect); *expected returns to education* (positively); *household income* (positively); *average local subsidies to education* (positively); *average local time to primary school* (negatively); perceptions of *insufficient access* (negatively) and perceptions of *insufficient quality* (negatively).

The key test of selection in demand for secondary education on the conditions of completion of primary education can be read in the statistical significance of the statistic *athrho*, presented in Table 44. It can be noticed that the statistic is not significant. The χ^2 test statistic and *p-value* also show one cannot reject the null hypothesis of exogeneity. Therefore, although there was a reasonable theoretical suspicion that a significant correlation between completion of primary education and attendance of secondary education existed, it does not seem to be the case. As the Heckman Probit model is estimated through a Full Information Maximum Likelihood method, the respective estimates for the coefficient result from an assumed asymptotic distribution that is different from the ones that result from a Probit or IV Probit estimation. The results of the second stage Heckman Probit model will therefore not be explored. They are, however, presented in the appendix in Table 60[94]. Not having found evidence of selection bias, the approach to the empirical analysis of demand for secondary education in post-conflict Timor will instead be pursued through both the Probit and IV Probit approaches, presented in Table 45 below.

It is important to highlight some variables that would theoretically be expected to be significant for the demand of secondary education but are empirically rejected as such.

[94] For comparison purposes, the estimates of coefficients of the Probit and IV Probit regressions in Table 60 are based on the sub-sample of those that completed primary school and is therefore a result of censoring in the sample.

Among these and most notably are the household income[95] and the local average education costs[96]. Parent's education[97], gender[98], status in the household (being a first child[99], being adopted or a niece or nephew), the composition of the household and the indicators of credit constraints[100] were also found not to be significant determinants of demand for secondary education in 2004/05 Timor.

Table 45: Secondary Education Demand – Probit and IV Probit Regressions and Marginal Effects

	(1)	(2)	(3)	(4)
			Marginal Effects	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of adolescent between ages 12 and 18, to have attended secondary school in the 2004/05 school year				
Constant	-30.438***	-22.343***	-	-
	(3.253)	(3.320)	-	-
Conflict: Shock of extreme violence during school life	**1.815*** **(0.275)**	**13.559*** **(2.771)**	**0.264*** **(0.038)**	**2.033*** **(0.396)**
Female	0.074	0.060	0.011	0.009
	(0.080)	(0.079)	(0.012)	(0.012)
Age	3.472***	2.366***	0.505***	0.355***
	(0.396)	(0.424)	(0.057)	(0.065)
Age^2	-0.107***	-0.072***	-0.016***	-0.011***
	(0.013)	(0.014)	(0.002)	(0.002)
Urban	-0.231**	-0.383***	-0.034**	-0.057***
	(0.117)	(0.117)	(0.017)	(0.017)
Father Attended School	0.251	-0.112	0.036	-0.017
	(0.226)	(0.233)	(0.033)	(0.035)
Mother Attended School	0.046	0.147	0.007	0.022
	(0.237)	(0.231)	(0.035)	(0.035)
Migrated	-0.023	-2.137***	-0.003	-0.320***
	(0.202)	(0.509)	(0.029)	(0.073)
First Child	0.094	0.141	0.014	0.021
	(0.113)	(0.112)	(0.016)	(0.017)
Adopted	0.012	-0.257	0.002	-0.039
	(0.252)	(0.258)	(0.037)	(0.039)
Niece/Nephew	-0.174	-0.237	-0.025	-0.036
	(0.185)	(0.181)	(0.027)	(0.027)
Married	-5.220***	-3.903***	-0.759***	-0.585***
	(0.849)	(0.583)	(0.118)	(0.084)

[95] In previous studies, as Cameron and Heckman (2001), Chow and Shen (2006) on China or Lincove (2012) in Nigeria, the household's income and wealth were found to have a significant effect on education demand. Deng et al. (2014) on China also had found such effect to be significant, more for girls than for boys.

[96] Found to be significant by studies such as Weir (2011) on Ethiopia.

[97] Found to be a significant covariate in studies such as the ones conducted by Qian and Smyth (2011) on China or Oketch et al. (2012) on Kenya.

[98] Referred recently in studies such as Albert and David (2012) on the Philippines.

[99] Referred as important in the qualitative interviews but also is studies such as Kingdon and Theopold (2008).

[100] Found to be relevant determinants of education demand in India by Kingdon and Theopold (2008) and, specifically in Andhra Pradesh, by Masset (2010)

Table 45: Secondary Education Demand – Probit and IV Probit Regressions and Marginal Effects (c.)

	(1)	(2)	(3)	(4)
			Marginal Effects	
	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se
Explained variable = Probability of adolescent between ages 12 and 18, to have attended secondary school in the 2004/05 school year				
Ln (Household Size)	0.238*	0.170	0.035*	0.025
	(0.141)	(0.143)	(0.021)	(0.022)
Share of boys 0-1	0.316	-1.304	0.046	-0.195
	(0.918)	(0.980)	(0.134)	(0.146)
Share of boys 2-4	-0.410	-1.336*	-0.060	-0.200*
	(0.697)	(0.724)	(0.101)	(0.108)
Share of boys 5-9	0.225	0.718	0.033	0.108
	(0.496)	(0.510)	(0.072)	(0.076)
Share of boys 10-14	-0.371	-0.063	-0.054	-0.009
	(0.478)	(0.484)	(0.070)	(0.073)
Share of men above 65	-0.059	-0.421	-0.009	-0.063
	(0.765)	(0.765)	(0.111)	(0.114)
Share of girls 0-1	-0.223	1.278	-0.032	0.192
	(0.960)	(0.970)	(0.140)	(0.144)
Share of girls 2-4	-0.733	-1.935**	-0.107	-0.290**
	(0.846)	(0.870)	(0.124)	(0.132)
Share of girls 5-9	-0.459	-0.389	-0.067	-0.058
	(0.516)	(0.527)	(0.075)	(0.079)
Share of girls 10-14	0.818*	0.650	0.119*	0.097
	(0.453)	(0.452)	(0.066)	(0.068)
Share of women above 65	-2.473**	-0.593	-0.360**	-0.089
	(1.003)	(1.032)	(0.143)	(0.154)
Completed Years of Education	0.473***	0.190***	0.069***	0.029***
	(0.037)	(0.065)	(0.003)	(0.010)
E(Returns to Education)	108.457***	312.137***	15.777***	46.796***
	(11.175)	(56.633)	(1.384)	(7.975)
Average local wage	-0.133	-0.150	-0.019	-0.023
	(0.196)	(0.190)	(0.028)	(0.029)
Number of cows owned	0.006	-0.017	0.001	-0.003
	(0.011)	(0.011)	(0.002)	(0.002)
Household had a loan denied	0.118	-0.247	0.017	-0.037
	(0.232)	(0.253)	(0.034)	(0.038)
Per capita Monthly Household	0.001	0.002**	0.000	0.000**
Expenditure	(0.001)	(0.001)	(0.000)	(0.000)
Average local education costs	0.003	0.002	0.000	0.000
	(0.003)	(0.003)	(0.000)	(0.000)
Average local subsidies to	0.027**	0.044***	0.004**	0.007***
education	(0.011)	(0.011)	(0.002)	(0.002)
Average time to secondary school	-0.004***	-0.005***	-0.001***	-0.001***
	(0.001)	(0.001)	(0.000)	(0.000)
Insufficient Access	-4.782**	4.746	-0.696**	0.712
	(2.185)	(3.065)	(0.316)	(0.456)
Insufficient Quality	-27.023**	-39.957***	-3.931**	-5.990***
	(11.588)	(10.690)	(1.686)	(1.581)
Insufficient Security	-27.842*	-52.132***	-4.050*	-7.816***
	(14.245)	(13.569)	(2.080)	(2.020)
District fixed effects	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes
N	4099	4099	-	-
Pseudo-R^2	0.5742	0.5614	-	-
Log-likelihood	-42225.329	-43496.579	-	-

* p<0.10, ** p<0.05, *** p<0.01. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

On the other hand, both the Probit and IV Probit regressions suggest that an effect from conflict may exist over the demand for secondary education in Timor, five years after it finished. According to the Probit marginal effect estimates (column 3), an adolescent that was one standard deviation more likely to have experienced a shock of extreme violence while of school age would have been, in 2004/05, 11% more likely to have

attended secondary school than an otherwise similar one. According to IV Probit marginal effect estimates (column 4) the difference would have been much higher, i.e. 84% more. While the value of the IV Probit may appear excessive, it seems to confirm that the endogeneity the use of instruments sought to correct was indeed one of underestimation, suggesting therefore that the real effect is superior to the one estimated through the Probit regression. Nonetheless, while the absolute values of the IV Probit estimates are much higher, the estimated standard deviations are also much higher, suggesting lower efficiency. It is noticed that this suggested effect holds in an empirical model that encompasses many of the theoretically expected covariates of demand for education.

An analysis of these also confers some interesting insights. In agreement with the indication of late entry into education and looking at marginal effects estimates (columns 3 and 4), an added year of education correlates with a higher probability of attendance. The estimates suggest this increase to be between 22% and 31% in the Probit regression and between 16% and 22% in IV Probit regression, decreasing with age. Those adolescents residing in urban settings appear to have a slightly lower probability to attend secondary school, between 3.4% and 5.7% less, than otherwise similar rural adolescents[101]. Marriage presents itself as a critical life changing effect, compromising education progression in post-conflict Timor. Depending on the regression method, the estimated marginal effects suggest a reduction in the probability of attending secondary school lower by 59% to 75% for a married adolescent, relative to an otherwise equal unmarried one.[102] While the household income appear either to be

[101] However, many other correlates show to be more beneficial in urban setting and significantly leading to higher probabilities of school attendance. Their coefficients seem high enough for the urban effect to be suggested as a correction of those.

[102] As an illustration, these were the words of a man interviewed, from the sub-district of Laclubar, district of Manatuto:

statistically insignificant or to yield close to null estimated average marginal effects (as shown in column 4), external support to education seems to significantly promote a higher attendance to secondary school[103]. The marginal effects of a one standard deviation increase in support (corresponding to an increase in USD$4.00 per month) seemingly corresponds to an increase in the probability of attendance of 2% to 3%. A reduction in the time cost of transiting to school, namely through better transport or an increase in the school density, also correlates with higher secondary school attendance[104]. A decrease of one standard deviation, 17.1 minutes, appears to yield an estimated increase in school attendance of close to 2%. Finally, also the perceptions of school quality and conditions of security in accessing education in 2004/05 appear to be significant[105]. A prevalence of drop-outs in the district attributed to insufficient quality that were to be lower in one standard deviation (i.e. of 2.3% less) appears to correspond to a probability of school attendance higher in 9% to 14%. On the same token, a prevalence of drop-outs in the district attributed to insufficient security that were to be lower in one standard deviation (i.e. of 1.3% less) would, on average, correspond to an estimated probability of school attendance higher in 5% to 10%.

These empirical results while suggesting a possible peace dividend in secondary education, a higher preference for school among those that experienced higher levels of violence, also confirms much of the theoretical expected results regarding other covariates of education demand. The analysis of the covariates suggests some insight on

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> *'My first daughter went to Kupang, Indonesia. She didn't finish secondary school because she married. Now she has 5 children. My second son only completed pre-secondary. He didn't follow school because of too much love, so he married already and lives in (...) Soibada'*
> Second man from Laclubar (2012)

[103] Glewwe and Kassouf (2012) had also found positive effects of cash transfer programmes in Brazil in stimulating demand for education.
[104] Distance to school was also seen as a barrier to demand in Ethiopia, by Weir (2011)
[105] This result finds resonance in others, like Kingdon and Theopold (2008) on India or Weir (2011) on Ethiopia.

indirect effects of conflict. In this case, the suggestion is that these may be detrimental. As seen above, demand for secondary education appears to significantly increase with higher returns to education and perceptions of better school quality, while not being significantly reactive to household income. As discussed in section 2, all these dimensions are likely to still suffer from ill-effects of conflict, even 5 years after it has passed. Particularly in the case of returns to education there seems to be evidence in Timor, as estimated in Chapter 1, that this may be the case. If so, these dimensions can restrain the improvement in attendance of secondary school, despite household and adolescent's preferences towards it.

In order to assert whether there may be a measurable and inferable middle-run legacy of conflict, a set of robustness tests was performed. The first test sought to test the robustness of the estimate of impact of conflict to the introduction of the systemic covariates included in the vectors X_1, X_2 and X_3 of the empirical model. This was done in a stepwise process and the results presented in Table 61, in the appendix. Looking into the first stage, although the distance to the border is shown to be strong, one cannot reject the exogeneity of conflict and the IV Probit estimate cannot be used in the simplest demand model. The estimate of the IV Probit regression appears not to be very robust to the introduction of the second set of covariates, with the instrument appearing to be less significant and despite the rejection of exogeneity. However, the Probit estimates keep their sign and show relatively similar values for the estimated coefficient in all three regression models (columns 1, 3 and 5). Some concern should be put on the relative weakness of the IV Probit estimates. Nonetheless, it may result from the fact that, by construction, the IV estimates for the conflict indicator, generated in the first step, are dependent on the variables and quality of that regression. Bearing this in mind, the addition of $X_2$and X_3 into the empirical model adds sound theoretically established

determinants of demand for education, most of them found significant in the IV Probit estimation and allowing for IV estimates that show to be robust in the remaining tests. Therefore, the IV estimates were still accepted. A second test looked into the assumption that school age started when the individual reached the age of 6 years. The presumption here is that the individual would have been expected to start school at that age. While that is the legal age of first enrolment in primary school, it is not possible to know whether that would have been the case. Bearing in mind the indication of late entry into school, alternate indicators of conflict were constructed assuming that school had started at the age of 7 or 8 and regressions were conducted with the full set of covariates of demand for secondary education. The results are presented in Table 62 in the appendix. As it can be seen there, although there is a relative (and expectable) reduction in the value of the coefficients, they remain positive, sufficiently high and statistically significant. The assumptions regarding entry can be differently explored in an added robustness test. With school starting at age 7 or 8, the cohort of reference can be assumed to be, respectively, between 13 and 19 and between 14 and 20 years old. The results of this test are presented in Table 63 in the appendix. Both Probit and IV Probit estimates show themselves significant and robust. Nonetheless, as before, there is suggestion that the IV Probit estimates are much less efficient. Another test was done on the assumption that an extreme shock of violence corresponds to an annual average level of killings in the district of birth in excess of 2 standard deviation for the average level for all years and districts during the Indonesian occupation (1975-1999). The test was done by constructing alternative indicators of conflict with a threshold of 1 or 3 standard deviations above average and with the regressions being conducted with the full set of covariates of demand for secondary education. The results are presented in Table 64 in the appendix. Again, the estimates, both of the Probit and the IV Probit

regressions appear to be robust, although the latter estimators show themselves to have higher standard deviations and, therefore, less efficient. Finally a test was done on the assumption that the extreme levels of violence during the conflict were experienced by the adolescents in their own districts of birth. That would not be the case for those that migrated out of their district of birth before reaching their school age or while of school age. In that case, the assumption generates a measurement error as they would have, in fact, experienced different levels of violence. The test of this assumption had the regressions ran only with the sub-sample of those that did not migrate, with the full set of covariates, and are presented in Table 65 in the appendix. Also here both the Probit and IV estimates show themselves as robust, keeping the sign, significance and not changing the value of the coefficient significantly. Here again, the IV Probit estimators, with much higher standard deviations, appear less efficient. Based on the results of these estimations and the robustness tests, one can find empirical support to affirm that a positive medium-run effect of conflict existed over the demand for secondary education in 2004/05, five years after the conflict ended. Considering that much of the theoretically established covariates of demand are part of the empirical model, there is a possible suggestion that this effect operates via preferences. Another channel can be post-conflict aid that is not explicitly controlled in the model, although it would be likely to induce effects via the household income, access to school, opportunity costs, explicit in the empirical model, or preferences themselves (via "nudging" effects). A decomposition of the sample according to gender, in Table 46 (with the first-stage of the IV Probit in Table 66 in appendix), and urban/rural residence, in Table 47 (with the first stage of the IV Probit in Table 67 in appendix), may allow for some unpicking of the effects.

A reading of Table 46 shows that the coefficient of the impact of conflict on demand for the boys in all regressions is higher than for girls. The difference does not appear significant except in the IV regressions. However, in Table 66 it can be seen that the IV regression with the subsample of girls does not generate inferable estimates, as the instrument isn't a significant regressor of conflict. On the other hand, the coefficient in the regression for boys is not statistically significant. Some statistical weaknesses can also be found in the regressions on urban and rural subsamples, as shown in Table 67 (in the appendix) and Table 47.

Table 46: Secondary Education Demand – Marginal Effects - Probit and IV Probit Regressions – All and decomposition by gender

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Girls		Boys	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of adolescent between ages 12 and 18, to have attended secondary school in the 2004/05 school year						
Conflict: Shock of extreme violence during school life	**0.264*** (0.038)**	**2.033*** (0.396)**	**0.263*** (0.056)**	**0.540* (0.291)**	**0.275*** (0.053)**	**2.079 (1.599)**
Female	0.011	0.009	.	.	.	.
	(0.012)	(0.012)	.	.	.	.
Age	0.505***	0.355***	0.583***	0.508***	0.436***	0.291**
	(0.057)	(0.065)	(0.082)	(0.080)	(0.077)	(0.121)
Age^2	-0.016***	-0.011***	-0.018***	-0.016***	-0.013***	-0.008**
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.004)
Urban	-0.034**	-0.057***	-0.043**	-0.030	-0.029	-0.058**
	(0.017)	(0.017)	(0.022)	(0.020)	(0.023)	(0.027)
Father Attended School	0.036	-0.017	0.053	0.033	0.027	-0.024
	(0.033)	(0.035)	(0.039)	(0.040)	(0.048)	(0.062)
Mother Attended School	0.007	0.022	-0.110*	-0.096*	0.067	0.083
	(0.035)	(0.035)	(0.059)	(0.058)	(0.049)	(0.051)
Migrated	-0.003	-0.320***	-0.074	-0.093	0.044	-0.295
	(0.029)	(0.073)	(0.047)	(0.062)	(0.035)	(0.292)
First Child	0.014	0.021	0.030	0.031	-0.003	0.005
	(0.016)	(0.017)	(0.022)	(0.023)	(0.024)	(0.025)
Adopted	0.002	-0.039	0.013	0.007	-0.024	-0.062
	(0.037)	(0.039)	(0.051)	(0.052)	(0.055)	(0.068)
Niece/Nephew	-0.025	-0.036	-0.019	-0.026	-0.033	-0.043
	(0.027)	(0.027)	(0.034)	(0.035)	(0.034)	(0.036)
Married	-0.759***	-0.585***	-0.539***	-0.542***	(a)	(a)
	(0.118)	(0.084)	(0.091)	(0.078)	(a)	(a)
Ln (Household Size)	0.035*	0.025	0.046	0.049	0.017	0.005
	(0.021)	(0.022)	(0.028)	(0.030)	(0.027)	(0.030)
Share of boys 0-1	0.046	-0.195	-0.165	-0.209	0.302*	0.067
	(0.134)	(0.146)	(0.164)	(0.165)	(0.168)	(0.257)
Share of boys 2-4	-0.060	-0.200*	-0.149	-0.233	0.035	-0.075
	(0.101)	(0.108)	(0.144)	(0.148)	(0.133)	(0.167)
Share of boys 5-9	0.033	0.108	0.037	0.058	0.019	0.112
	(0.072)	(0.076)	(0.095)	(0.096)	(0.095)	(0.119)
Share of boys 10-14	-0.054	-0.009	-0.134	-0.128	0.012	0.065
	(0.070)	(0.073)	(0.093)	(0.093)	(0.103)	(0.110)
Share of men above 65	-0.009	-0.063	0.022	-0.030	-0.027	-0.067
	(0.111)	(0.114)	(0.143)	(0.148)	(0.151)	(0.159)
Share of girls 0-1	-0.032	0.192	0.019	0.054	-0.067	0.150
	(0.140)	(0.144)	(0.150)	(0.157)	(0.219)	(0.294)

Table 46: Secondary Education Demand – Marginal Effects - Probit and IV Probit Regressions – All and decomposition by gender (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Girls		Boys	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of adolescent between ages 12 and 18, to have attended secondary school in the 2004/05 school year						
Share of girls 2-4	-0.107	-0.290**	0.104	0.058	-0.270	-0.479*
	(0.124)	(0.132)	(0.118)	(0.122)	(0.197)	(0.255)
Share of girls 5-9	-0.067	-0.058	-0.174	-0.205*	0.010	0.053
	(0.075)	(0.079)	(0.112)	(0.115)	(0.097)	(0.103)
Share of girls 10-14	0.119*	0.097	0.046	0.046	0.175*	0.168*
	(0.066)	(0.068)	(0.085)	(0.086)	(0.092)	(0.096)
Share of women above 65	-0.360**	-0.089	-0.370**	-0.282	-0.415**	-0.128
	(0.143)	(0.154)	(0.176)	(0.189)	(0.206)	(0.295)
Completed Years of Education	0.069***	0.029***	0.069***	0.063***	0.068***	0.026
	(0.003)	(0.010)	(0.004)	(0.008)	(0.005)	(0.038)
E(Returns to Education)	15.777***	46.796***	15.632***	16.414***	16.704***	48.525
	(1.384)	(7.975)	(2.102)	(6.013)	(2.062)	(32.008)
Average local wage	-0.019	-0.023	0.002	-0.003	-0.057	-0.059
	(0.028)	(0.029)	(0.034)	(0.032)	(0.044)	(0.047)
Number of cows owned	0.001	-0.003	-0.001	-0.001	0.004**	0.000
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.004)
Household had a loan denied	0.017	-0.037	-0.010	-0.026	0.028	-0.026
	(0.034)	(0.038)	(0.037)	(0.040)	(0.050)	(0.065)
Per capita Monthly Household Expenditure	0.000	0.000**	0.000	0.000	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Average local education costs	0.000	0.000	0.001	0.001	0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Average local subsidies to education	0.004**	0.007***	0.004*	0.004*	0.004*	0.007**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Average time to secondary school	-0.001***	-0.001***	-0.001***	-0.001***	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Insufficient Access	-0.696**	0.712	-0.833**	-0.770*	-0.529	0.798
	(0.316)	(0.456)	(0.419)	(0.468)	(0.435)	(1.211)
Insufficient Quality	-3.931**	-5.990***	-4.080	-1.405	-4.951**	-7.133***
	(1.686)	(1.581)	(2.539)	(1.864)	(1.986)	(2.358)
Insufficient Security	-4.050*	-7.816***	-4.564	-2.942	-4.693*	-7.998**
	(2.080)	(2.020)	(2.894)	(2.760)	(2.806)	(3.377)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4099	4099	1997	1997	2096	2096
Statistics from the underlying regressions						
Pseudo-R2	0.5742	0.5614	0.6241	0.6091	0.5529	0.5405
Log-likelihood	-42225.329	-43496.579	-18667.559	-19416.317	-22038.121	-22646.023

* p<0.10, ** p<0.05, *** p<0.01 (a) perfectly predicts failure; Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

The effect suggested in Table 47 are of a higher impact being felt in urban areas than in rural ones where the IV Probit estimate is non-significant. However, within the urban subsample the instrument is shown in Table 67 to be weak and exogeneity cannot be rejected, rendering invalid an inference based on the IV estimates. It is, therefore, not possible to infer significant impacts of conflict within either of the subsamples. The difference, much more tenuous, is still apparent in the Probit estimates. It may be the case that post-conflict economic development provides a slightly stronger signal on the benefits of education to urban dwellers.

Table 47: Secondary Education Demand – Marginal Effects - Probit and IV Probit Regressions – All and decomposition by urban/rural

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Urban		Rural	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of adolescent between ages 12 and 18, to have attended secondary school in the 2004/05 school year						
Conflict: Shock of extreme violence during school life	**0.264*** (0.038)**	**2.033*** (0.396)**	**0.291*** (0.066)**	**2.692*** (0.741)**	**0.256*** (0.051)**	**-1.064 (6.350)**
Female	0.011	0.009	0.034	0.035	0.004	0.006
	(0.012)	(0.012)	(0.022)	(0.022)	(0.013)	(0.016)
Age	0.505***	0.355***	0.802***	0.570***	0.382***	0.463
	(0.057)	(0.065)	(0.102)	(0.114)	(0.067)	(0.395)
Age^2	-0.016***	-0.011***	-0.025***	-0.018***	-0.012***	-0.014
	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)	(0.013)
Urban	-0.034**	-0.057***	.	.	.	.
	(0.017)	(0.017)	.	.	.	.
Father Attended School	0.036	-0.017	0.067**	0.000	0.013	0.035
	(0.033)	(0.035)	(0.034)	(0.041)	(0.049)	(0.166)
Mother Attended School	0.007	0.022	-0.064	-0.050	0.039	0.040
	(0.035)	(0.035)	(0.053)	(0.053)	(0.039)	(0.054)
Migrated	-0.003	-0.320***	0.029	-0.372***	0.012	0.176
	(0.029)	(0.073)	(0.040)	(0.136)	(0.045)	(1.156)
First Child	0.014	0.021	0.028	0.037	0.005	0.001
	(0.016)	(0.017)	(0.033)	(0.034)	(0.018)	(0.032)
Adopted	0.002	-0.039	-0.053	-0.118*	0.013	0.046
	(0.037)	(0.039)	(0.064)	(0.070)	(0.041)	(0.146)
Niece/Nephew	-0.025	-0.036	-0.109***	-0.134***	0.027	0.030
	(0.027)	(0.027)	(0.041)	(0.042)	(0.028)	(0.038)
Married	-0.759***	-0.585***	-0.904***	-0.749***	(a)	(a)
	(0.118)	(0.084)	(0.162)	(0.134)	(a)	(a)
Ln (Household Size)	0.035*	0.025	0.091**	0.082**	0.022	0.028
	(0.021)	(0.022)	(0.036)	(0.038)	(0.024)	(0.043)
Share of boys 0-1	0.046	-0.195	0.144	-0.168	0.100	0.244
	(0.134)	(0.146)	(0.264)	(0.284)	(0.153)	(0.842)
Share of boys 2-4	-0.060	-0.200*	-0.060	-0.246	-0.050	-0.014
	(0.101)	(0.108)	(0.174)	(0.186)	(0.121)	(0.395)
Share of boys 5-9	0.033	0.108	0.088	0.186	0.054	0.020
	(0.072)	(0.076)	(0.130)	(0.133)	(0.085)	(0.261)
Share of boys 10-14	-0.054	-0.009	-0.089	-0.061	-0.019	-0.030
	(0.070)	(0.073)	(0.124)	(0.124)	(0.083)	(0.169)
Share of men above 65	-0.009	-0.063	-0.247	-0.316	0.060	0.049
	(0.111)	(0.114)	(0.249)	(0.261)	(0.121)	(0.151)
Share of girls 0-1	-0.032	0.192	0.125	0.433*	-0.110	-0.272
	(0.140)	(0.144)	(0.234)	(0.253)	(0.182)	(0.853)
Share of girls 2-4	-0.107	-0.290**	-0.117	-0.313	-0.110	-0.018
	(0.124)	(0.132)	(0.292)	(0.302)	(0.123)	(0.552)
Share of girls 5-9	-0.067	-0.058	-0.245*	-0.270*	0.045	0.057
	(0.075)	(0.079)	(0.146)	(0.152)	(0.078)	(0.090)
Share of girls 10-14	0.119*	0.097	0.110	0.090	0.103	0.116
	(0.066)	(0.068)	(0.108)	(0.113)	(0.080)	(0.118)
Share of women above 65	-0.360**	-0.089	0.195	0.616***	-0.515***	-0.667
	(0.143)	(0.154)	(0.235)	(0.238)	(0.143)	(0.837)
Completed Years of Education	0.069***	0.029***	0.080***	0.024	0.065***	0.096
	(0.003)	(0.010)	(0.006)	(0.018)	(0.004)	(0.146)
E(Returns to Education)	15.777***	46.796***	16.704***	60.472***	15.714***	-14.889
	(1.384)	(7.975)	(2.029)	(15.029)	(2.044)	(127.008)
Average local wage	-0.019	-0.023	-0.017	-0.014	-0.017	-0.025
	(0.028)	(0.029)	(0.040)	(0.040)	(0.045)	(0.044)
Number of cows owned	0.001	-0.003	0.001	-0.004**	0.000	0.003
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.012)
Household had a loan denied	0.017	-0.037	-0.134**	-0.205***	0.044	0.068
	(0.034)	(0.038)	(0.057)	(0.062)	(0.038)	(0.167)
Per capita Monthly Household Expenditure	0.000	0.000**	0.000	0.000***	0.001*	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Average local education costs	0.000	0.000	0.000	0.000	0.000	0.001
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Average local subsidies to education	0.004**	0.007***	0.006***	0.009***	0.005*	0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.008)
Average time to secondary school	-0.001***	-0.001***	-0.000	-0.000	-0.001***	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 47: Secondary Education Demand – Marginal Effects - Probit and IV Probit Regressions – All and decomposition by urban/rural (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample		Urban		Rural	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Explained variable = Probability of adolescent between ages 12 and 18, to have attended secondary school in the 2004/05 school year						
Insufficient Access	-0.696**	0.712	-5.601*	-28.429***	-0.062	2.918
	(0.316)	(0.456)	(3.367)	(7.245)	(0.962)	(13.582)
Insufficient Quality	-3.931**	-5.990***	0.461	0.030	-3.052	3.491
	(1.686)	(1.581)	(0.928)	(1.194)	(2.968)	(35.482)
Insufficient security	-4.050*	-7.816***	-27.220**	-100.780***	40.228	-57.393
	(2.080)	(2.020)	(13.324)	(26.041)	(48.729)	(529.116)
District controls	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic controls	Yes	Yes	Yes	Yes	Yes	Yes
N	4099	4099	2048	2048	2026	2026
Statistics from the underlying regressions						
Pseudo-R2	0.5742	0.5614	0.5341	0.5222	0.5917	0.5798
Log-likelihood	-42225.329	-43496.579	-15024.990	-15411.018	-25478.264	-26219.685

* p<0.10, ** p<0.05, *** p<0.01 (a) perfectly predicts failure; Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Addison and Murshed (2005) refer that post-conflict growth is potentially distortionary, favouring urban sectors such as infrastructure reconstruction over agriculture. Looking at international aid interventions, Chambers (2013, 1987) warns against such an urban bias. According to the Timorese Aid Transparency Portal (Ministry of Finance, 2014), a significant part of the international aid projects operate in the districts with the four main cities, Dili (the capital; with 286 reported projects, out of 346[106]), Baucau (216 projects), Ermera (229 projects) and Maliana (211 projects) which seems to confirm this bias. This may suggest that post-conflict economic development may have a role in a more urban nature of the positive legacy of conflict on preferences for secondary education.

An analysis of the significant channels of indirect impacts of conflict on the demand for education shows that returns to education seem to have a positive average effect over the secondary school attendance of girls and urban dwellers, but may not have on boys and rural dwellers. Conversely, perceptions of access to and quality of education seem to affect adolescents differently, along these characteristics. Girls appear more sensitive to lack of access to school. Boys, on the other hand, appear sensitive to issues of lack of

[106] Most of the projects are multi-district.

quality and insecurity. This latter case may have been linked to a higher involvement of young men in vigilante groups during the first years of independence, leading to a civic strife in 2006 and 2007 and as reported by Scambary (2009), Goldsmith (2009) and Muggah et al. (2010). This may have led to a higher rate of school drop-outs among boys, as also suggested by Justino et al. (2013). Those living in urban areas appeared to be more sensitive to lack of access and security, while lack of quality does not seem to be a differentiating factor after splitting the population according to urban/rural location of residence. This latter case may occur due to a higher heterogeneity between the two typologies than within them, as suggested in the data review in section 4. Given that urban adolescents have easier access to school and perceive it to be the case, the nationwide estimate is indicative of urban/rural inequalities that should be object of further future attention.

A synthesis of the inferred medium-run effects may be, then, presented: there is a suggestion that an eventual peace dividend of increased preferences for education, induced either by a resilience effect or by other factors such as post-conflict aid, may exist and be more prominent in urban areas; there is as indication that indirect impacts through lower returns to education manifest themselves homogenously; finally, the results also suggest that indirect impacts through worse factors of school quality were differently felt by adolescents of different gender and place of residence requiring a more targeted response.

Some other interesting and intriguing empirical results are also found. In Table 46 it can be noticed that girls whose mothers attended school seem to have a lower probability to attend secondary school. This may, however, be a result of the very low education of their mothers, close to 1 year on average, which may reduce the value that these mothers place on the education of their daughters. Marriage affirms itself as a cause of

school drop-out for both adolescent girls and boys alike, with certainty of drop-out in the case of the TLSLS (2007) sampled married boys of the age between 12 and 18. In Table 47, there is suggestion that some of the factors determining demand for secondary education are prevalent only in the urban spaces. A migrant adolescent in an urban space appears to be less likely to attend secondary school. The same seems to be the case for nieces or nephews of the head of household, a result that contradicts an indication in many of the reports collected in qualitative interviews. A larger household size also seems to benefit the urban dwellers but not those living in rural areas. Only in urban spaces does the indicator of credit constraints (denied loans) seem to have a bearing on the likelihood of an adolescent attending secondary school. Finally, only in these spaces it is clear that local external support to education increases the probability of attendance to secondary education. On the other hand, only in rural spaces is the time needed to go to school a significant deterrent to demand. These urban/rural differences suggest different livelihoods patterns, and challenges met by populations in urban and rural areas and recommend targeted policies to be implemented.

In synthesis, the empirical results suggest a significant richness of insights regarding post-conflict demand for secondary education, using the case of Timor in 2003/04, five years after its independence fight was won. They suggest diverse patterns of demand and its drivers, from adolescent girls to boys, but even more so from rural to urban areas. They suggest that covariates such as the expected returns to education and school quality, both shown to suffer detrimental impacts from conflict, in other cases and settings, but also in Timor (as is the case of returns to education), matter in the decision to attend secondary education. Finally, they suggest that beyond all other covariates, a possibility of a peace dividend exists, as those that experienced a shock of extreme violence appear to be more likely to attend secondary school than other equivalent

adolescents that were relatively spared from it. The channel is not completely clear: resilience effects may be behind it but also the effects of unobserved factors such as post-conflict aid may have their influence. Noticeably, this effect seems more significant in urban areas and less so in rural ones, correlating with a reconstruction effort that has, so far, shown some urban bias. Future research should seek to deepen the understanding of the possible channels through which this indication of resilience manifests itself, seek to verify if it manifests in other post-conflict settings, look at future surveys, and analyse its persistence.

6- Conclusion

Secondary education stands out in the gap between the Millennium Development Goals of Universal Primary Education in the "developing world" and the focus on demand for higher education in the "developed world". This gap is being filled, so far, by an arguably remedial focus of labour policies and aid on the development of technical and vocational training programmes. As such, there is a clear risk of secondary education to be largely forgotten by policy and research on development. Yet it is in the progression beyond primary school and the achievement of enabling conditions for a "good job" that parents and adolescents put their hope, with secondary education being perceived by them to be a fundamental step in that direction.

In a post-conflict setting such as Timor-Leste, the aspirations of young people (the majority of the national population) must be heavily weighted, as the risk of a "youth bulge" becoming a driver of continued fragility and future violence is evident.

The present study sought to better understand the factors that determine demand for secondary education in a post-conflict setting. It also sought to identify and elucidate the

middle-run impacts of conflict: how its adverse effects may persist, diminish over time or reverse, some years after the traumatic experiences occurred.

In the case of Timor, the final experience of violence in 1999 was particularly devastating, with extreme levels of killings, destruction of property and forced displacement. While the country was able to almost totally overturn the latter two effects, though relocation and reconstruction, other effects have persisted. In some cases, income levels have not recovered; the quality of schooling has suffered; and the expectations of future returns to education have not fully recovered from the conflict

According to previous research, including on Timor, the effects of conflict on choices regarding education (enrolment and attendance) or outcomes (attainment) were expected to be negative. However, the empirical results reported in the present study suggest that a peace dividend may exist and that those who survived extreme violence may in fact manifest a higher preference for secondary education. This result seems to be present when tested together with a set of other covariates that economic theory affirms to correlate with demand for education. These findings show some robustness, suggesting predominance of a resilience effect that shifts preferences towards furthering education.

The causal pathways by which these linkages operate are yet not fully clear. The higher preference for secondary education among the youth surveyed may have been induced by psychological resilience or by other factors such as the stimulus of post-conflict reconstruction aid. Further research should also seek to establish whether the result found in this study depends on the typology of conflict (a war of secession that was won), the level of education or the cohort experiencing violence. Chapter 2 applied a similar empirical strategy to understand conflict's impacts on demand for primary

education; it found a suggestion of higher attendance of primary education by those most affected by the latter stages of the Timorese conflict but those results proved not to be robust. The robustness of results presented in the present study may be because the adolescents experienced the conflict at an age where they were able to rationalize it, along with the dynamics of post-conflict reconstruction. If this is true, when children currently of primary school age are old enough to begin secondary education, the link between the experience of conflict and higher preference for education may not be observed. Such an analysis of the longer-run effects of conflict also warrants further research.

The indication of a higher preference for secondary education among the Timorese adolescents that survived the 1999 shock of extreme violence does not vary by gender. However, perceptions of school quality appeared to affect attendance levels of adolescent girls and boys differently. Girls' attendance reacted significantly and negatively to more difficulties in accessing school. Boys were not significantly affected by that but, on the other hand, reacted to the lack of quality of teaching.

Wider differences are apparent between rural and urban areas, both in terms of the way adolescents' demand for secondary education reacted to extreme conflict as well as to other drivers of education. Some factors deserve further attention, such as evidence of a relative exclusion of internal migrants from secondary education in urban spaces. Other factors indicate different settings of incentives and constraints that warrant further research and targeted policy. One example is the suggestion that external support to education is only effective in urban areas. Another is the suggestion that the distance from homes to schools only has a detrimental effect in rural areas.

A final word should be given to policy. While a peace dividend is suggested, in the form of a higher preference for schooling, other covariates of secondary education suggest that there is a need for policy efforts to sustain households' inclination for education. Having established in Chapter 1 that returns to education are present only in activities related with international aid, there is a risk that household preferences may become distorted into this narrow employability sector. This creates a high risk of unmet aspirations, which policy should strive to avoid in fragile post-conflict settings such as Timor-Leste. Policy should also seek to create more effective incentives to education, particularly for rural students, and to improve school quality. The latter is already a priority for the Timorese Government (Ministry of Education, 2011). Again, in a post-conflict ethnically diverse society such as the Timorese is, the signal of lower attendance of secondary education by migrant adolescents in urban spaces should be an area of policy concern. Policy, however, should not only focus on factors of supply and demand in the education sector. It cannot overlook the links between the education sector and the whole Timorese economy. Together with the improvement of education, there is the need of an economic policy geared to generate employment opportunities for qualified workers in the domestic sectors, so as to reinforce the effects of expected returns to education on demand.

Conclusion

This concluding chapter will revisit the contributions of this thesis to the economics of education with regards, in particular, to the effects of conflict on returns to education and on demand for primary and secondary education in a post-conflict setting. The first three sections will review each chapter. The next sections will then briefly discuss how conflict can leave a legacy by influencing economic processes in the medium-run, in the light of the Timorese case, and then synthesize findings. Each section will also discuss policy implications and possible paths for future research.

Chapter 1 – Post-conflict returns to education

The first chapter analysed the effect of the 25 year long violent occupation of Timor-Leste on returns to education in 2007, a few years after the conflict ended. It looked at how conflict impacted upon an important economic signal: the value of education as an investment.

Analysis of the evidence provided two main findings: first, individuals' experiences of violence while they were of school age reduced the returns they could otherwise have gained from further years of education. This result supports the hypothesis that those who suffered a higher intensity of violence while of school age would have found more difficulty in acquiring skills from education and would have become less productive. It also indicates that the experience of extreme violence - and the disruption this causes to livelihoods and to access to education - can create a scarcity of human resources, thus making them more expensive. This effect does not act as a substitute for the previous effect; it happens simultaneously with the decreased productivity occurring through the first channel. In addition to these variables another dimension of conflict also led to

important effects, namely, that the political conditions under which education occurred affected participation in the post-conflict labour market. The evidence, however, also raised questions about the process through which this influence occurred. Further research is needed on the relations between political control and participation in the labour market. In summary, chapter 1 showed that violent conflict led to a scarcer (and therefore more expensive) and less qualified labour force in Timor-Leste. This may explain why a post-conflict country is likely to have lower returns to education than other, comparable, countries and suggests that conflict reduces the economic incentives for education.

Another important finding of chapter 1 is that the difficulty of promoting education in a post-conflict country results not only from the experience of conflict, but also from the economic post-conflict setting. The Timorese evidence shows that returns to education are only significant for those people employed by projects funded by international cooperation. This result is not surprising. Wage profiles in the public sector tend to be flatter due to equality pressures exerted through the social contract: they will be lower than the market level in highly qualified work and higher than the market rate for less qualified work. It is, in general, the private sector that generates the income incentives for education. However, as the chapter showed, post-conflict countries like Timor-Leste tend to have a depressed private sector. This situation creates a distortion in the labour market, attracting the most qualified labour away from national organizations and the national economy. It also creates an incentive to pursue academic programmes that increase employability in international projects, to the detriment of the domestic government and private initiative. Lundahl and Sjöholm (2009) suggest there is a risk that the public sector could siphon the best human resources out of the private sector. The analysis in this thesis suggests that the international aid sector may be exacerbating

this risk. This evidence provides lessons for both international development cooperation and national governments about the need to analyse and improve hiring and remuneration policies, particularly for candidates with higher qualifications. Otherwise, they risk contributing to the 'brain-drain' dynamic by creating competition between international actors and the body that needs to be the ultimate provider of social services, the State. In this way remuneration policies can impair the recovery from fragility. Further research should consolidate these findings in Timor-Leste and other post-conflict settings, as well as where the international aid sector represents a large source of demand for qualified labour.

This portion of the research faced data constraints that impeded the endogeneity of education (namely the effects of ability) and the endogeneity of conflict to be corrected. As a result, the estimates of returns to education – which are already low - are likely to be over-estimated, and the impacts of conflict underestimated. As data quality improves in Timor-Leste, it may be possible to seek an empirical correction of these estimates. Cognitive and learning tests recently conducted on primary school children might open a path for such tests to be incorporated in a future Living Standards Measurement Survey (LSMS). The correction of endogeneity in conflict settings poses further challenges, as data collection on (and during) conflict is particularly difficult. Some scope may come from the introduction of a conflict module in the LSMS, as proposed by Brück et al. (2013).

Chapter 2 –

On medium-run legacies of conflict upon the demand for primary education

The second chapter analysed an empirical model of demand for primary education, seeking to assess whether inferable evidence of medium-run effects of conflict can be

found. Both the qualitative life story interviews and descriptive statistics suggested that a child who had experienced higher levels of violence during the Timorese conflict had a slightly higher attendance at primary education in the medium-run post-conflict. This suggestion of higher attendance at primary school level in Timor-Leste, five years after the conflict had ended, is a new result, not suggested by much of the previous literature concerning the impacts of conflict on education. As presented in the review, the effects of conflict on demand for education in other settings - while it is occurring or in the short-run post-conflict stage - appear to be negative. In Timor-Leste, the data suggested that another sort of impact could be present, namely, a higher preference for education operating as a possible resilience effect.

The empirical evidence for the full sample appeared to suggest that to be the case. However, the empirical results showed not to be robust. While the Probit regressions estimated a negative effect arising from the experience of conflict, the analysis suggested that endogeneity of conflict could cause these effects to be overestimated. When an IV approach was applied, the econometric tests and the coefficients of the conflict indicators confirmed this hypothesis. However, these coefficients proved not to be robust to the age of entry in school and to the decomposition of the sample, where inference from Instrumental Variable estimates was found not to be valid. Similarly, they were not robust in relation to the test on the assumptions regarding the location of where conflict was experienced. Therefore, although there was an indication of an overestimation of negative effects due to endogeneity and an indication of positive effects in the full sample, this latter result cannot be confirmed as robust.

The chapter then discussed other channels through which conflict might impact upon demand for primary education. These channels were: first, that conflict might have particularly affected household's income generating capacities and, through it, reduced

demand for primary education; second, that conflict might have reduced the quality of education in the most-affected districts to such a degree that it had not recovered after five years of the post-conflict period, again with detrimental effects on demand for primary education. On both accounts, there is evidence that Timor-Leste in 2004/05 had yet not fully recovered from the conflict. The results in the chapter established that household income and perceived quality are significant drivers of demand for primary education and, therefore, possible channels providing legacies of conflict in the medium-run. Although evidence in other settings suggests both channels to be affected by conflict, further research should evaluate whether, and how, these impacts occurred in the medium-run. There is also a need for research examining other potential channels, and the development of better approaches to empirically test for their existence.

The results found in this chapter also suggest the need for further research on the relation between expected returns to education and demand for primary education. The research suggested that households might face liquidity constraints; future research should validate this insight, since this dimension not only affects education, but can reinforce poverty traps, as found by Masset (2010).

The evidence on both income and perceived quality of education suggests that policy should focus on addressing these significant channels through which the experience of conflict may leave legacies in the medium-run. Policy should focus on the supply side of primary education, particularly on the quality of provision, but it should not overlook significant signals of demand restrictions, particularly those that are income related. The evidence also implies the need of a particular focus on possible discrimination, not only gender based but, in an ethnically diverse post-conflict setting such as Timor-Leste, also concentrate on migrant children in urban settings, so as to prevent possible sources of grievance.

Among the avenues of research of medium-run legacies of conflict it is possible to examine the impacts of conflict on post-primary education, taking into account that adolescents both have more influence upon their educational choices and were older at the time of the most extreme violence. This line of investigation was followed with the analysis of secondary education in Chapter 3.

Chapter 3 – A peace dividend for secondary education?

This chapter examined the factors that determine demand for secondary education in a post-conflict setting. It sought to provide insights about an area of needed research, the middle-run impacts of conflict and how these effects persist, diminish or are eventually reversed. This research examined the area by looking at demand for education at a level that has, so far, been under-researched, secondary education. In Timor-Leste, the most recent experience of violence was particularly devastating and income levels and quality of schooling had not fully recovered five years after its occurrence. As Chapter 1 argued, the expected returns to education are very likely to have suffered and to have not yet fully recovered. However, the results presented in Chapter 3 suggested that some sort of peace dividend may exist and that those that survived extreme violence may have a higher preference for secondary education. This result is robust when tested alongside other theoretically-relevant covariates. It suggests that a resilience effect (or other possible channels such as signalling effects from aid-driven reconstruction programmes) is creating a greater preference for further education. It also suggests an effect has been detected that runs contrary to what previous research, focused on in-conflict or short-run post-conflict impacts, has suggested.

While uncovering this evidence, it now suggests further research should seek to establish whether this effect depends on the typology of conflict (for example, a war of

secession that was won), the level of education or the cohort experiencing violence. Chapter 2 applied a similar empirical strategy to understand the impacts of conflict on demand for primary education. The results of this approach suggest there was a higher attendance of primary education by those most affected by the latter stages of the Timorese conflict; however, those results proved not to be robust. The robustness of results presented in Chapter 3 may be because the adolescents experienced the conflict at an age where they were able to rationalize it, along with the dynamics of post-conflict reconstruction. If this is true, when children currently at primary school age are old enough to begin secondary education, the link between the experience of conflict and higher preference for education may not be observed. Such an analysis of the longer-run effects of conflict also warrants further research.

The indication of a higher preference for secondary education among the Timorese adolescents that survived the 1999 shock of extreme violence does not vary by gender. However, perceptions of school quality appeared to affect attendance levels of adolescent girls and boys differently. Girls' attendance reacted significantly, and negatively, to the increased difficulties of accessing school. Boys were not significantly affected by that aspect but, on the other hand, reacted to the lack of quality teaching.

There are apparent differences between rural and urban areas, both in terms of the way adolescents' demand for secondary education reacted to extreme conflict as well as to other drivers of education. The apparent exclusion of internal migrants from schools in urban spaces, already indicated in primary education, deserves further attention especially in relation to policy. The findings that external support to education appears to be effective only in urban areas, and that being at a distance from school appears to have a particularly negative effect but only in rural areas, reinforce the importance of

targeting education policies in each different setting. These findings also recommend that specific research be conducted in each of the spaces – in urban and rural areas.

The chapter also considered further policy implications of these findings. While a peace dividend is suggested, in the form of a higher preference for schooling, other covariates of secondary education suggest that there is a need for policy efforts to sustain households' inclination for education. Having established in Chapter 1 that returns to education are present only in activities related with international aid, there is a risk that household preferences may become distorted into this narrow employability sector. This creates a high risk of unmet aspirations, which policy should strive to avoid in fragile post-conflict settings such as Timor-Leste. Policy should also seek to create more effective incentives for undertaking education, particularly for rural students, and seek to improve school quality. The latter is already a priority for the Timorese Government (Ministry of Education, 2011). Again, in a post-conflict ethnically diverse society such as the Timorese, the signal of lower attendance of secondary education by migrant adolescents in urban spaces should become an important area of policy concern. Policy, however, should not only focus on factors of supply and demand in the education sector. It cannot overlook the links between the education sector and the whole Timorese economy. Together with the improvement of education, there is the need for an economic policy geared to generate employment opportunities for qualified workers in the domestic sectors, so as to reinforce the effects of expected returns to education on demand.

Overcoming conflict in its multidimensional forms and impacts

This study assessed the plausibility that the experience of conflict would have an impact upon incentives and decisions regarding education in the medium-run post-conflict

stage. Building on previous conflict literature, it started by presuming that such impacts were likely to exist and sought to measure them. It did so acknowledging that conflict can generate diverse forms of violence.

Using the available datasets, the research sought to measure the effects of experiencing different intensities of violence, in the form of killings and disappearances. It found that these variations have significant medium-run effects on returns to education and demand for primary education (although in this later case, the results were not robust).

It also found empirical results suggesting that the experience, and survival, of shocks of extreme violence may also have induced changes in behaviour that persisted in the medium-run. This was evidenced in the case in secondary education.

It also highlighted the possibility that extreme hunger, resulting from the deliberate military tactics of the occupiers, could generate a scarcity of qualified human resources, with impacts on the earnings' structure of a post-conflict labour market.

This research sought also to construct a dataset of the degrees of political control, to try and depict effects of conflict that go beyond those that result from violence. Looking at documented reports of the conflict, it classified, for each district and year, the level of control sustained by the opposing forces of the Indonesian Army (ABRI) and the Timorese Resistance (and its army, FALINTIL). This endeavour, and the results which flowed from it, are discussed in the appendix. The dataset was then used in the analysis of post-conflict returns to education. These findings suggest that effects of having lived under different typologies of political control had an influence on the likelihood of participating in the post-conflict formal labour market.

The effects of diverse dimensions of conflict on demand for education and expected returns to education were researched. Qualitative research tools, particularly life story interviews allowed for invaluable insights into the effects of the experience of conflict on the perceptions and aspirations of the Timorese; this assisted in the construction of empirical models of demand for education. The results, despite the many data limitations and methodological constraints, were, in most of the cases, significant and robust.

Due to data constraints, other forms of conflict related violence - such as the destruction of assets and forced displacement - could not be analysed, although previous literature suggested these factors are likely to influence post-conflict preferences, incentives and economic behaviours.

The analysis in this study had to confront serious data limitations. These are characteristic of the quantitative analysis of conflicts and their impacts. The use of reported data makes the study more prone to measurement errors, while the possibility of endogeneity, even after controlling for structural covariates and time-invariant district and ethnic characteristics, makes it particularly challenging to find robust results.

Nonetheless, some robust results were found. They related to different dimensions of conflict (such as killings, hunger and political control) and their links with post-conflict economic behaviours and indicators (such as demand for primary and secondary education, returns to education and participation in the formal labour market).

This study found evidence that a conflict may still leave a legacy in the medium-run. Looking at education in a post-conflict setting, in Timor-Leste, it empirically confirmed what was previously only an intuition suggested in the conflict literature, namely, that

conflict does reduce returns to education. To do so it proposed a testable theory on the channels through which conflict affects returns to education. It then suggested, with different degrees of robustness, that, beyond other significant and theoretically established covariates of demand for education, the experience of overcoming conflict may induce a higher preference for education. This result, found in a country such as Timor-Leste that had overcome and won a secession war, may be specific to this typology of cases. It may, on the other hand, be a more general medium-run effect arising from the acquisition of peace. Further research on other contexts may help to validate this result.

Contributions to a better understanding of post-conflict education in Timor-Leste

Throughout the research conducted, this thesis established that the experience of conflict still exerts medium-run impacts on demand for education and its drivers, particularly on economic incentives such as returns to education.

Through this research, some other insights contribute to a deeper understanding of education in a post-conflict setting such as Timor-Leste, five years after independence.

A first insight comes from the realization that, five years after surviving a conflict, still Timor-Leste faces negative impacts of the violence endured over the processes through which the labour market values education. Individuals' experiences of violence while they were of school age reduced the returns they could otherwise have gained from further years of education. It has established that, via returns to education, a legacy from conflict afflicts demand for secondary education. This legacy is derived not only from lower returns to education signalled to those that experienced higher levels of violence but also from a distortion of the post-conflict labour market towards aid related sources of employment. As returns to education were shown to significantly incentivize demand

for secondary education, policy should care for its sectorial distribution, seeking to have it express more sectorial differences in productivity. This research suggests the need evaluate the wage structures of both public and national private sectors to assess the reasons why they did not, and may still today fail to, provide significant education premiums that stimulate education progression.

The empirical results uncovered by this research also shed light on important characteristics of post-conflict demand for education. Income factors were confirmed in their importance as supporters of demand. Low income and liquidity constraints were found as significant deterrents of demand for primary education. Similarly, evidence was found of positive effects from external support, via subsidies, to secondary education, particularly in urban areas. These are indications that education policies in post-conflict settings need to pay special attention to household's budgetary constraints.

Experienced constraints in the access to education and in its quality were also shown to be significant determinants of demand, both of primary and secondary education. Inequalities of access were very apparent, with distance from school having a particularly negative effect in rural areas.

Finally, significant evidence of possible gender based discrimination and discrimination against migrant children and adolescents may have played a role, undermining equality of access to education in both primary and secondary school levels. Finally and significantly, the apparent exclusion of internal migrants from schools in urban spaces was also signalled both in primary and secondary education. In what is still a violence-prone environment, policy must look with particular concern to these evidences of inequality of opportunity among young Timorese.

In synthesis, when addressing the challenges of post-conflict education, a central suggestion that can be put forward as a result from this thesis is that the focus cannot be placed solely on the supply side of education. The need to focus on quality and ease of access was highlighted in both studies of demand and this should, indeed, make policy examine the supply side of education. In addition, there is also a need to focus on income constraints, costs of education, possible liquidity constraints, and the expected returns to education, particularly beyond primary school. These are drivers of the demand side of education and cannot be overlooked. In particular, the significance of returns to education on attendance of secondary school alerts us to the links between the labour market and the education sector. This gives an indication that labour market economic policies have an indirect effect on the choices of households regarding their investment in human capital.

The focus on drivers of demand such as income constraints and expected returns to education may be particularly important in post-conflict countries. Economic exclusion and unmet expectations of future education premiums are potential inducers of conflict relapse in post-conflict "youth bulge" societies, as Urdal (2006) and Urdal and Hoelscher (2009) suggest. Policies that mitigate inequalities of opportunity in the access to education and in the employment of qualified workers are particularly important in an ethnically diverse country such as Timor-Leste. There are, therefore, reasons for concern over rural and urban inequalities suggested in the research and, particularly on the indications of a possible exclusion of migrant children and adolescents from education in Timorese urban settings. These issues, taken together with the issue of potential poverty traps, should also be of particular concern if we seek to build a more effective and inclusive education policy in the current transition stage, "from conflict to

development" – a sentiment to which Timor-Leste and other conflict afflicted countries aspire.

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Appendix A -
A Chronology of Violence and Control during the Indonesian Occupation of Timor-Leste

The nature of a conflict is multidimensional in the forms of violence it imposes but also in the nature of political control and provision of services it allows. Depending on the level of control over the territories, the forces in contention are able and may choose to enact particular forms of violence, as discussed by Statys Kalyvas in his "Logic of Violence in a Civil War" (Kalyvas, 2006). Contrary to early assertions, though, not always is the case that violence is the main driver of behaviour change of economic agents, particularly, in the case of interest of this study, regarding education. It may be the case that the access to and quality of provision of education in a particular area results from who controls an area and how deep is the control. It may be the case that it is the rebels that control the area, making choices regarding the provision of public services, as discussed by Mampilly (2011), eventually establishing a social contract with the residents, as discussed by Arjona (2010). It may be the case, that it is the incumbent that controls and is seeking to establish the regular public services. It may be that the territory is under dispute, weakening control but also the provision of services. In those cases, the violence enacted in such territories is one of the symptoms of different types of control. Kalyvas (2006) proposes a nexus between forms of violence enacted over people in one territory and typologies of political control over them, that is explored in this study to generate indicators of political control, regarding each Timorese district and during each year of the Indonesian Occupation.

This chronology constructed reports the events of violence documented by Taylor (1999, 1990) and CAVR (2005) regarding the period of Indonesian Occupation of Timor-Leste, object of this thesis. Following the classification of typologies of political

control during conflict constructed by Kalyvas (2006), this chronology is used in support of the generation of variables indicative of political control during the Indonesian occupation of Timor-Leste. These indicators of conflict were tested in the analyses operated in support of the chapters of the thesis and are used in the Chapter 1 as significant covariates in the regressions of the first stage selection model of the Heckman regression on returns to education.

In the sections below, a brief conceptual framework will present the typologies of conflict and the process of identification of each according to the types of events of violence occurred, followed by a brief review of the chronology of events during the occupation of Timor-Leste by Indonesia and the attribution, for each year and district, of the type of control considered to be the one manifested. Finally, a summary table of types of control per district and year, used in support of the empirical analysis of this thesis is presented.

1- Conceptual Framework

The construction of a grid of political control by district and year requires a translation of events of violence, for which there are documented reports, into types of political control attributable to the territories.

In this approach, the study uses the framework of analysis used by Kalyvas (2006) when analysing the Greek Civil War, fought from 1946 to 1949 between the Greek government army (backed by the United Kingdom and the United States) and the Democratic Army of Greece, the military branch of the Greek Communist Party (backed by Yugoslavia, Albania, the Soviet Union and Bulgaria). In his study, Kalyvas disputes the theory of barbarism behind every form of violence and attributes to it a logic rationale. According to his study, violence can be decomposed in two forms:

selective (directed to a particular person or small group of perfectly identified people,) and indiscriminate (directed to a collective, a group of people where none is specifically identified as a target and used, namely, in reprisals, where guilt and punishment is assigned by association).

The aim of violence and it's use is summarized in this quote from Kalyvas (2006, p. 142):

> *'Both selective and indiscriminate violence are, in principle, instrumental forms of violence aiming to generate collaboration via deterrence. The distinction is based on the level at which "guilt" (and hence targeting) is determined'*

As such, the use of violence should follow rules that Kalyvas summarizes in two propositions. In a first proposition, in Kalyvas (2006, p. 132) he states:

> *'The higher the level of control exercised by an actor, the higher the rate of collaboration with this actor – and, inversely, the lower the rate of defection.'*

In the second, Kalyvas (2006, p. 144) states:

> *'Indiscriminate violence is counterproductive to civil war.'*

A grid of interpretation of effects of violence in civilians' responses can then be built, departing from a situation where the incumbents enact them while the insurgents/rebels are able and choose to protect or fail to do so due to lack of capacity or by choice:

Table 48: Response function to strategies of violence and protection

Insurgents / Incumbents	Protect	Fail to Protect
Selective Violence	Stalemate / Indeterminate	Civilians support Incumbents
Indiscriminate Violence	Civilians support Insurgents	Civilians support Incumbents

Based on Kalyvas (2006)

Building on these propositions and response grid, Kalyvas constructs a typology of control that is used in this study to categorize each Timorese district during each year of the Indonesian Occupation. Most of the international relations with legitimate Timorese

representatives were severed by Indonesia, seeking to stand as the ruler of an integrated province named Timor-Timur. All the characteristics of provision of public services by the Indonesian regime parallel those of an incumbent, while the nature of action by Timorese Resistance soon became parallel to insurgents/rebels. Therefore, for the purpose of this analysis and contrary to what international law has established, this study attributes an incumbent-like nature to the Indonesian occupiers and an insurgent-like nature to the Timorese Resistance fighting for independence. Following Kalyvas (2006) let control zone 1 be one where the incumbent holds full control, zone 2 be one where the control by the incumbent is contested by the insurgents, zone 3 be one where both sides contest control and none can claim to hold it even partially, zone 4 be one where the control is now held by the insurgents, while contested by the incumbent and zone 5 one which is fully controlled by the insurgents.

Using this typology of zones of control, a set of hypothesis, defined by Kalyvas, tested and proved to apply to the Greek civil war case, are here applied to the case of the Timorese conflict. In his first hypothesis, Kalyvas (2006, p. 169) states:

> *'Political Actors are likely to gradually move from indiscriminate to selective violence.'*

Hypothesis two, in Kalyvas (2006, p. 204) affirms:

> *'The higher the level of an actor's control, the less likely it is that this actor will resort to violence, selective or indiscriminate. Therefore, no incumbent violence is likely in zone 1 and no insurgent violence is likely in zone 5.'*

In hypotheses three, Kalyvas (2006, p. 204) states:

> *'The lower the level of an actor's control, the less likely is that this actor will resort to selective violence and the more likely that its violence, if any, is indiscriminate. Therefore, insurgent violence in zones 1 and 2, if any, is likely to be indiscriminate and incumbent violence in zones 4 and 5, if any, is likely to be indiscriminate.'*

Hypothesis four (Kalyvas, 2006, p. 204) announces:

> *'Under fragmented control, violence will be exercised primarily by the actor enjoying an advantage in terms of control: incumbents in zone 2 and insurgents in zone 4.'*

Finally, in his fifth hypothesis, Kalyvas (2006, p. 204) states:

> *'Parity of control between the actors (zone 3) is likely to produce no selective violence by any of the actors.'*

Using these hypotheses, a grid of interpretation can be constructed, based on the type of violence enacted and its perpetrator:

Table 49: Grid of interpretation

	Indiscriminate Violence	**Selective Violence**
Zone 1	Insurgents	-
Zone 2	Insurgents	Incumbent
Zone 3	Incumbent & Insurgents	-
Zone 4	Incumbent	Insurgents
Zone 5	Incumbent	-

Based on Kalyvas (2006)

This grid is then used to categorize each district of Timor-Leste, in each year of the Indonesian occupation according to the political actor, occupier or Resistance, and the level of control it seemingly exerts. The discussion of the chronology of events and attribution of control is presented in the next section.

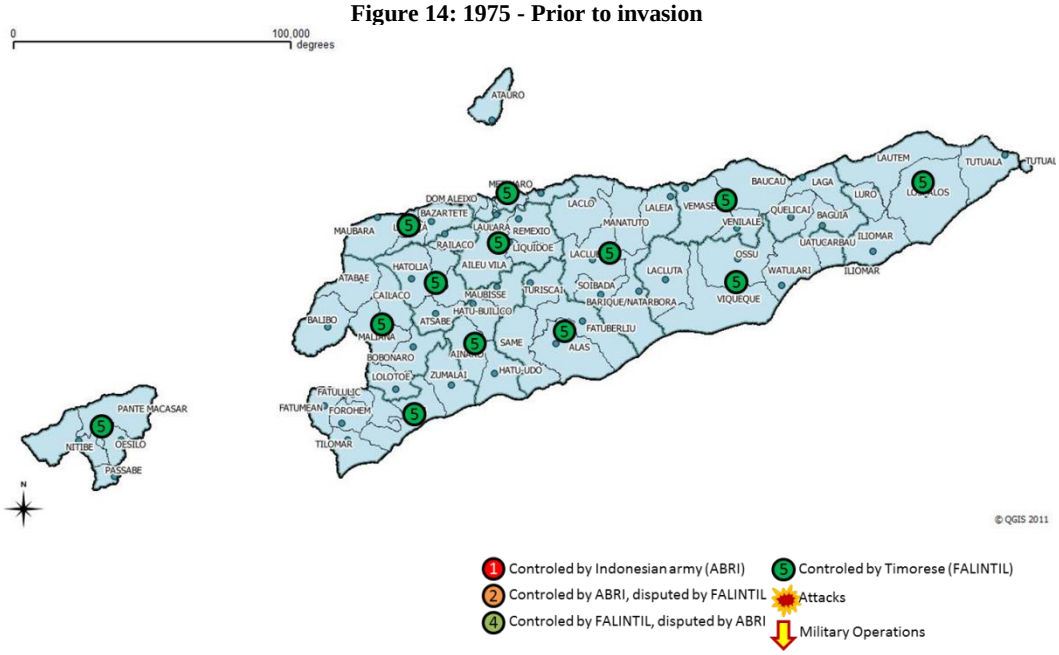
2- Chronology of events and political control

Using the conceptual framework presented above, it is possible to try an attribution of type of political control over the territory of each Timorese district based on the reports of violence documented in Taylor (1999, 1990) and CAVR (2005). As most of them refer to the acts of seemingly indiscriminate violence, it is possible to establish a distinction between zones 1-2 and zones 4-5. The assertion of full control is derived in this study from the absence of reports of violence in the year in question and the

previous one. If, for some district there wasn't any report of violence, then it is assumed that the political actor previously holding (disputed) control, would then hold full control. The exception to this rule in 1999, when as per the negotiated rules pertaining the referendum that were to lead to Timorese independence, the Resistance military branch (FALINTIL) was cantoned in Remexio, while all Timorese territory was assigned to the military rule and agreed protection of the Indonesian Army (the ABRI). In that year, all Timor-Leste is considered to be zone 1. Beyond the summary in this section, a full chronology of events and their interpretation for the attribution of a classification of zone of control is presented in the last section.

The starting point, however, is of all Timor-Leste as zone 5. Having been a Portuguese colony for nearly 500 years, Timor was in the process of acquiring independence, longed demanded by the international community, after the Portuguese democratic revolution of the 25th of April 1974. After one of the Timorese parties, FRETILIN (Frente Revolucionária de Timor Independente – Revolutionary Front of an Independent Timor), won a very short-lived civil war, from August to November 1975 and on the 28th of November 1975, it proclaimed the independence of Timor-Leste. In a week, Indonesia invaded.

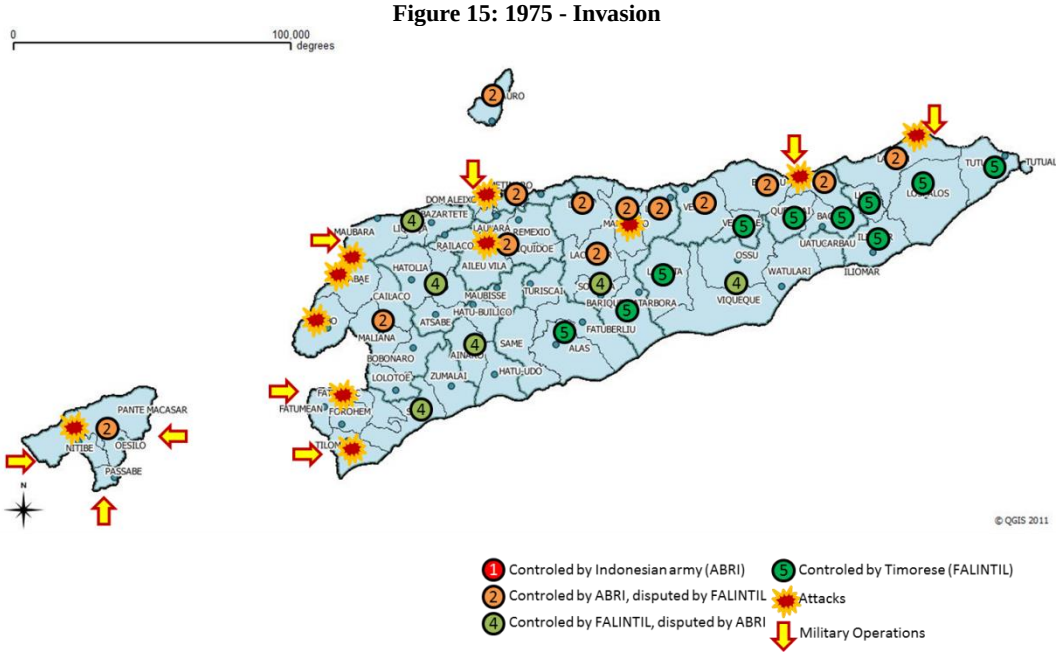
Figure 14: 1975 - Prior to invasion



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

While only in the first week of December 1975, did the Indonesian military (ABRI) officially declared the invasion towards the annexation of Timor-Leste, the first operations started with the occupation of Oecussi in September 1975.

Figure 15: 1975 - Invasion

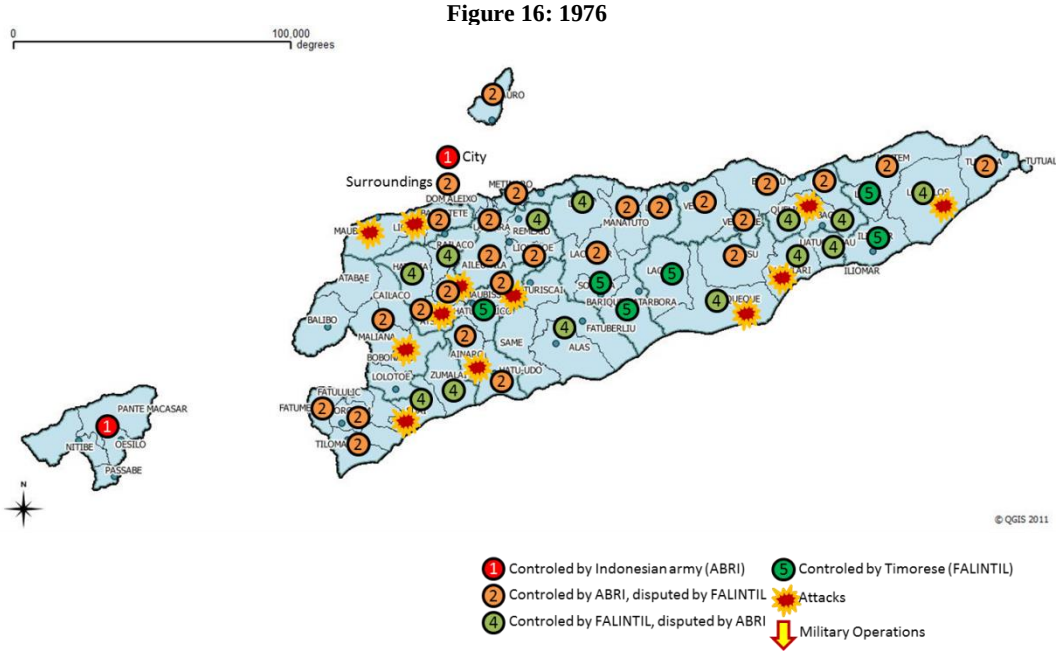


Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

Notably, this was much prior to the orchestrated Balibó Declaration of November 29th 1975, signed by all the leaders of Timorese parties to the exception of FRETILIN and

used by Indonesia to justify the official invasion. In the first year of invasion, the reports of attacks relate to the border districts and those with maritime ports in the North of the half-island, as summarized in the appendix. These districts were quickly controlled by the ABRI, but under contestation by the Timorese Resistance. The remaining districts were under Resistance control.

Figure 16: 1976



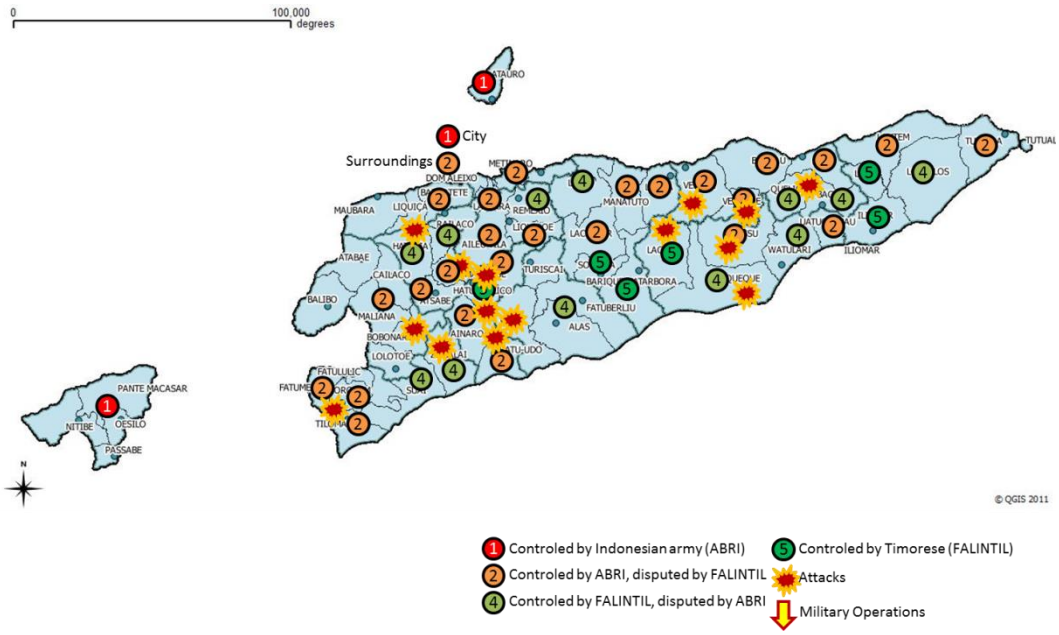
Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

In 1976, following the events reported, the Indonesian control was spreading through the Timorese territory, still stronger in the western districts. At this moment, the ABRI already had full control over Oecussi and the Timorese capital of Dili, while the highest sub-districts of Hatu-Bulico (district of Ermera), Soibada and Lacló (district of Manatuto), Laga (district of Baucau) and Luro and Iliomar (district of Lautem) were still Resistance strongholds.

The territorial distribution of control doesn't seem to have changed significantly during the year of 1977, pushing the ABRI to intensify the violence and the military operations, especially in the areas where the Resistance appeared to hold more control. The nature

of those attacks demonstrated characteristics of indiscriminate violence suggesting that control was still held by Timorese forces in some sub-districts, two years after the invasion. It is in this year that the bombings of Mount Matebian, in the sub-district of Laga, Baucau,began, which would last until 1979

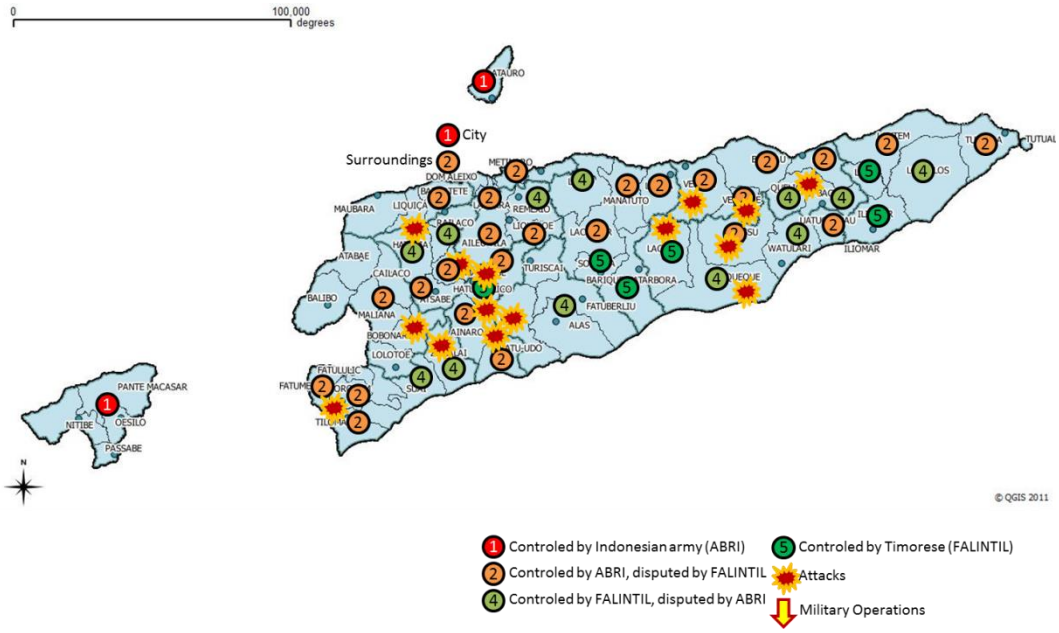
Figure 17: 1977



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

In 1978, the ABRI experienced a weakening of their control in the south-west districts. In reaction to it and to the unexpected delay in controlling the entire territory, the ABRI deployed a different strategy. They initiated an extremely violent encirclement operation: conscripting Timorese civilians to build a mobile human fence that would "comb" the Timorese forests in search of Resistance militants; displacing villages into easier to control compounds. Where possible these operations were supported by naval bombardment.

Figure 18: 1978

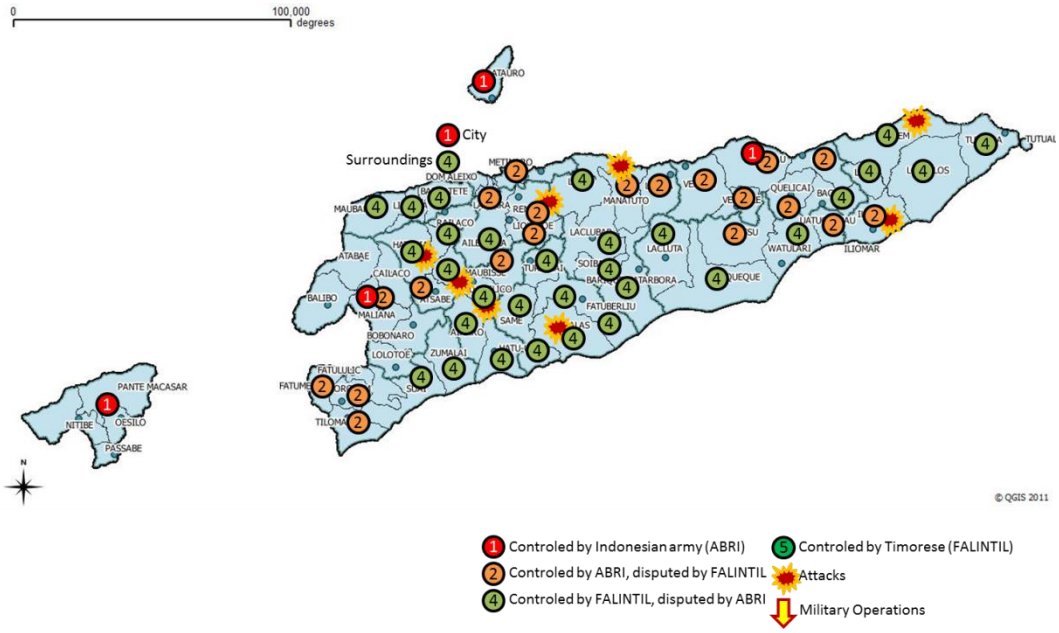


Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

The mountains of Mate Bian, Kablaki, Ossoala and Mundo Perdido, where Resistance could find more protection became special targets of Indonesian military actions. By the end of 1978, Mount Matebian falls into Indonesian control and the Resistance orders the surrender of close to 300,000 people. No area would be in their full control any longer.

According to the Far Eastern Economic Review, there were 165,835 displaced Timorese.

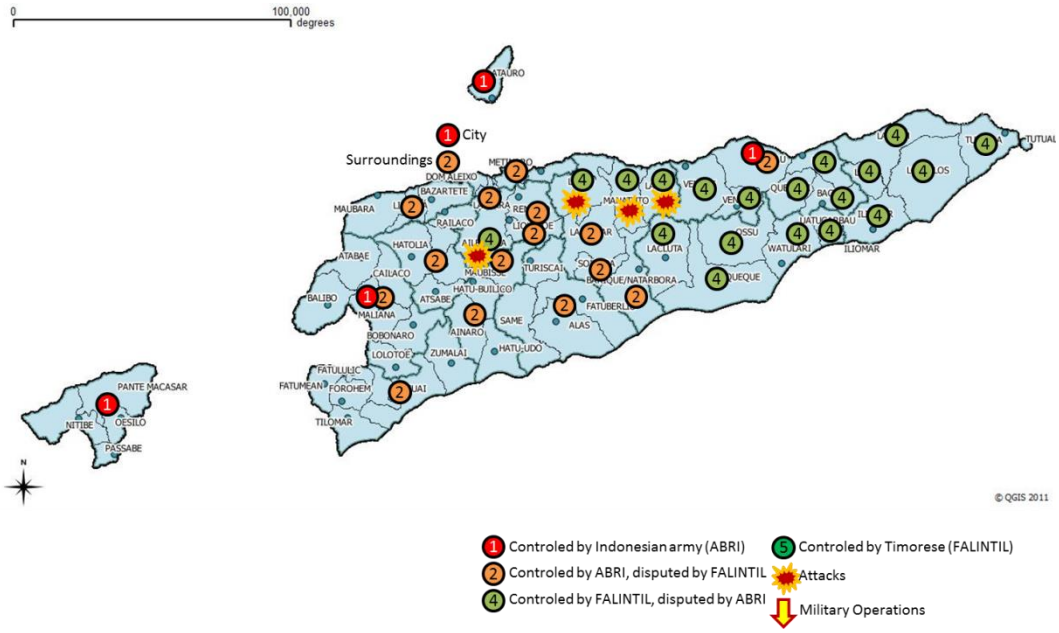
Figure 19: 1979



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

The year of 1979 is one of few military victories of the ABRI in the east, while the violence enacted in the west suggests some loss of control to the Resistance. It is also a year of symbolic victories, with the assassination of the then FRETILIN leader of the Eastern Region. The International Red Cross announces that the displaced population is facing deprivation and Mochtar Kusumaatmadja admits that 120 thousand Timorese had been killed since 1975. The year of 1979 marks a change of Resistance's strategy, as it builds contacts with the civilians to create a support clandestine network in areas under Indonesian control.

Figure 20: 1980



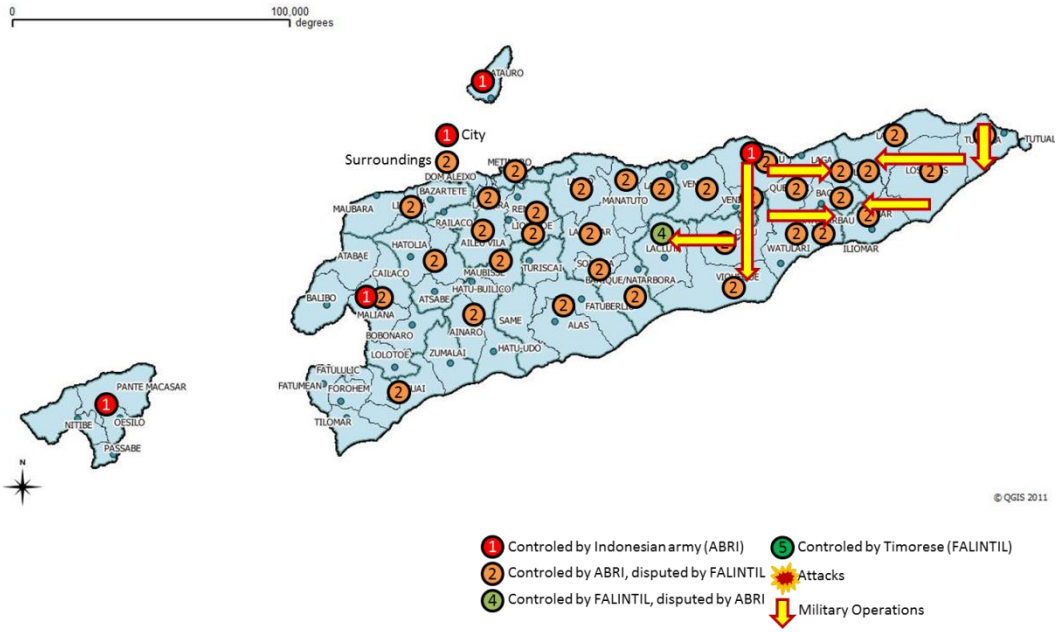
Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

The year of 1980 is reported to be one of resurgence from the Resistance, both in the east and the north-central regions.

However while the Resistance meets to reorganizes in 1981 and in reaction to its resurgence, the ABRI puts into place *Operation Keamanan* (fence of legs): a line was formed, starting from Tutuala and creating a human fence linking Com, Raça, Lospalos and Iliomar; a second line began linking Venilale, Ossu and Viqueque towards the northeast; both lines were to converge on Mount Matebian; a final phase tried to force FALINTIL soldiers into Lacluta, Viqueque, where a massacre occurred.

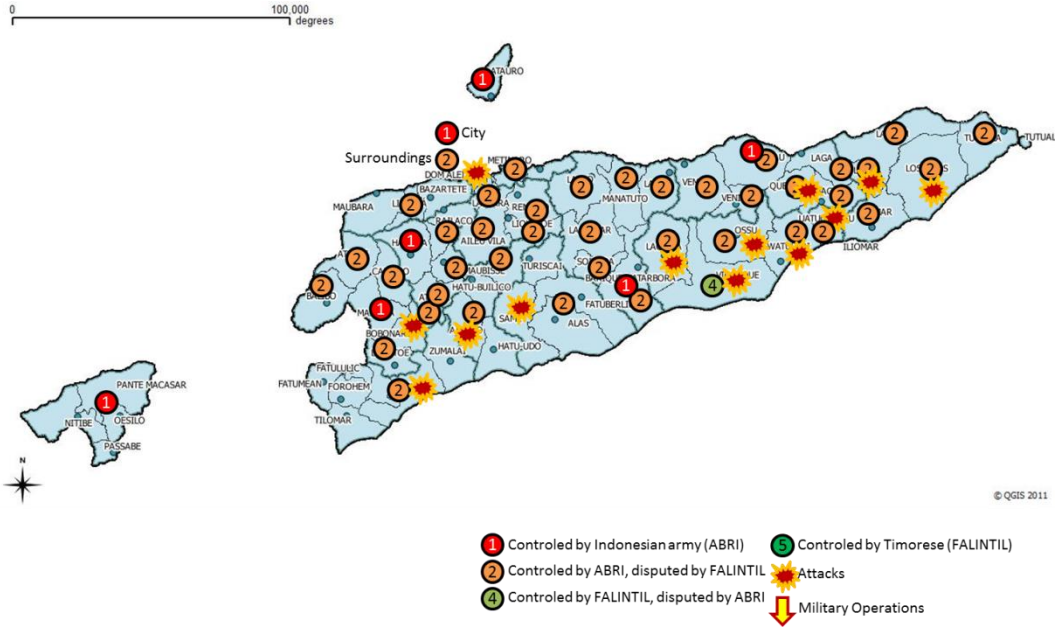
In this year, Indonesia asserted its control in an unprecedented form, controlling almost all of the territory by the end of that year.

Figure 21: 1981



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

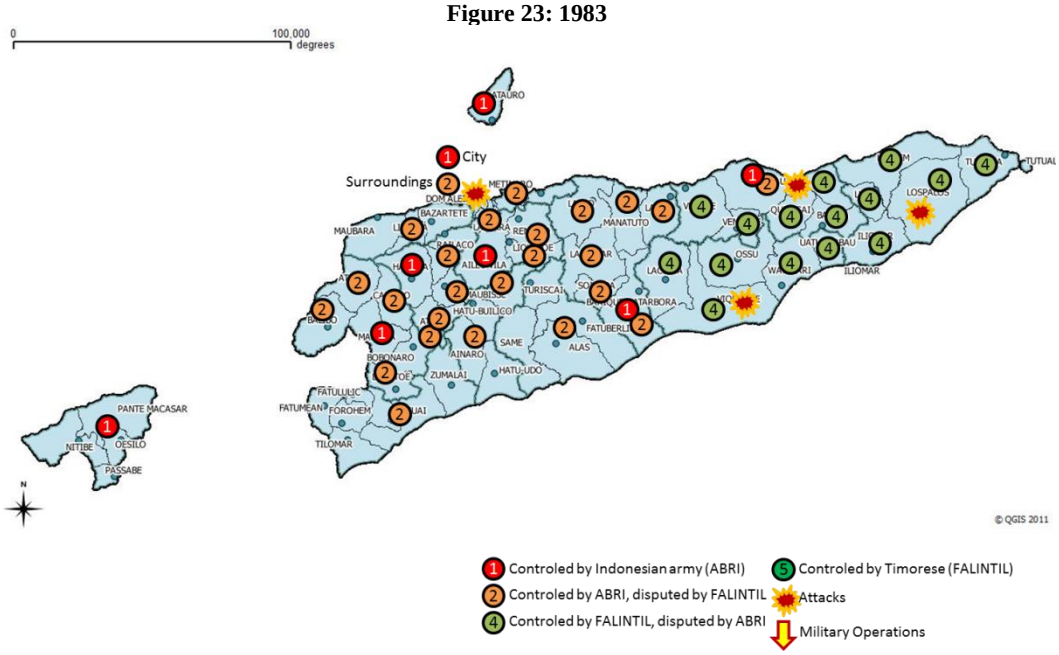
Figure 22: 1982



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

The control reached in 1981 allows Indonesia to invite the Australian Prime Minister to visit Timor next year, in 1982. However, the Resistance would enact attacks in various districts and in Viqueque an Indonesia sponsored local election could only occur in the district capital.

Figure 23: 1983

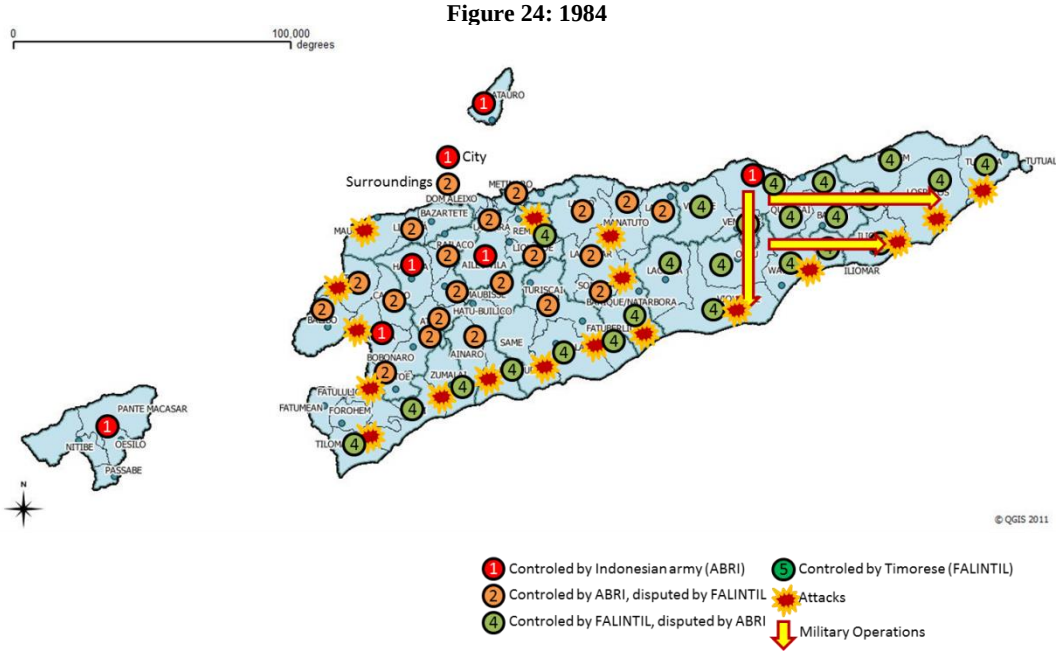


Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

In 1983 a ceasefire would be signed. The documented events suggest that some degree of territorial division occurred, with the Resistance recovering some of what it had lost in the eastern districts. This is suggested by the fact that, when breaking the ceasefire, ABRI launched an attack to this region at the same time that Timorese policemen, of the Indonesian HANSIP force defected to FALINTIL (the military branch of the Resistance).

The year of 1984 is one where more contestation by both forces of the control each other held in the districts of Timor. While ABRI attacks the Eastern districts, the Resistance counter-attacks in the Centre and south-western ones. In the end of that year, the head of the Indonesian military in Timor announces that the conflict would still take time to resolve.

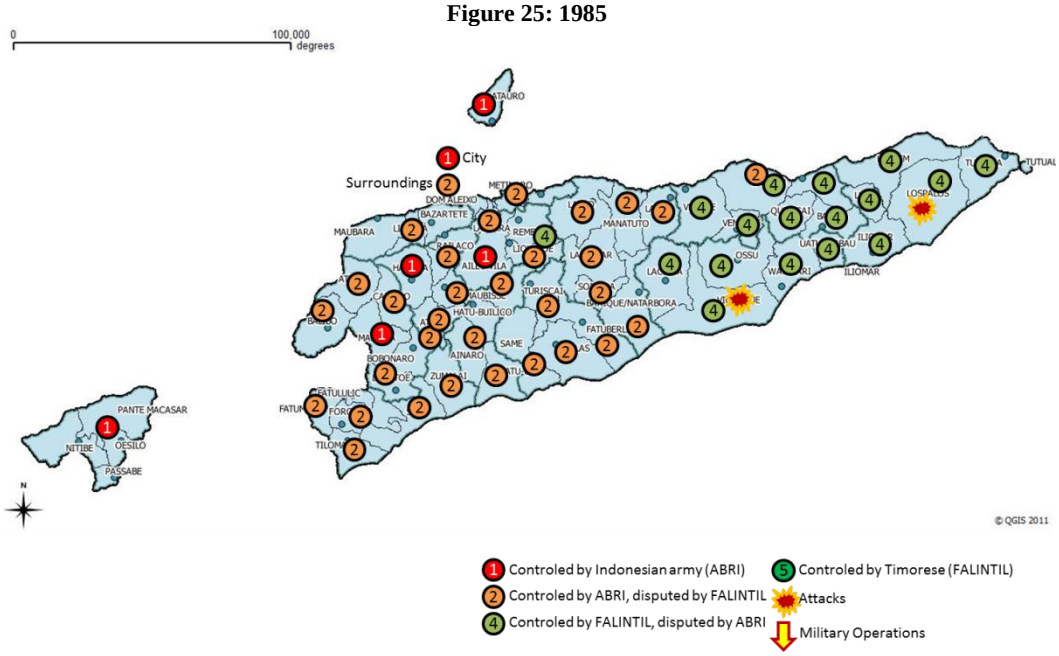
Figure 24: 1984



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

Not much is reported in 1985, suggesting a stabilization of positions between ABRI and the Resistance. However, Baucau was deemed "unsafe", suggesting that the control was contested.

Figure 25: 1985

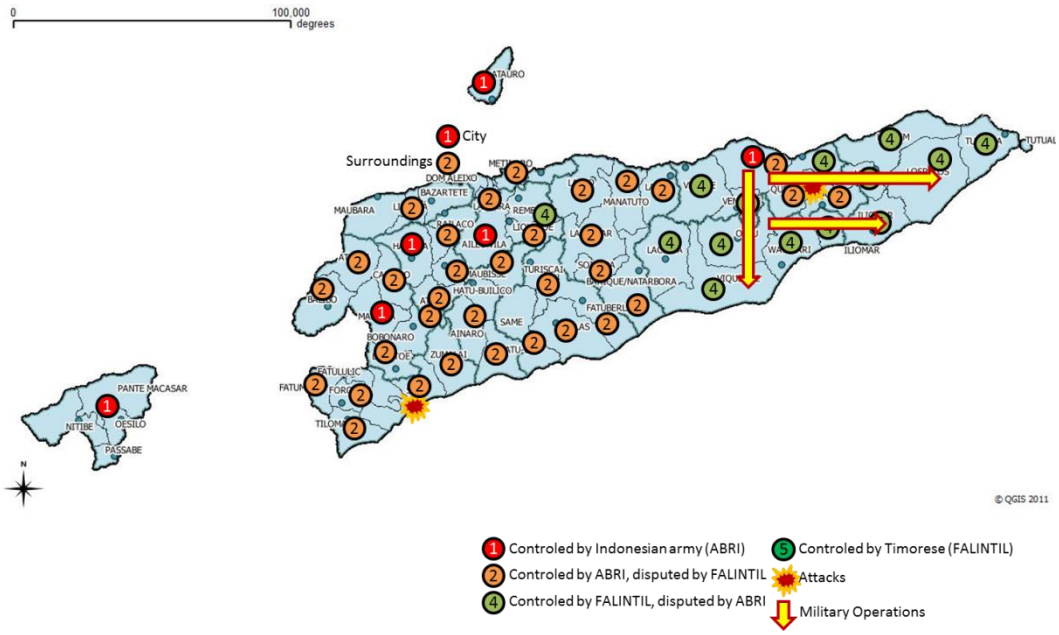


Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

The year of 1986 brings reports of operations by ABRI east of the line Baucau-Viqueque contesting Resistance's control of the area. The city of Baucau already hosts a

prison for Timorese captured by the ABRI suggesting control of the city. Indonesian investments are announced in the Covalima district, again suggesting control is being strengthened there. However a letter reports the fights taking place in Suai, the capital of that district, suggesting it was contested.

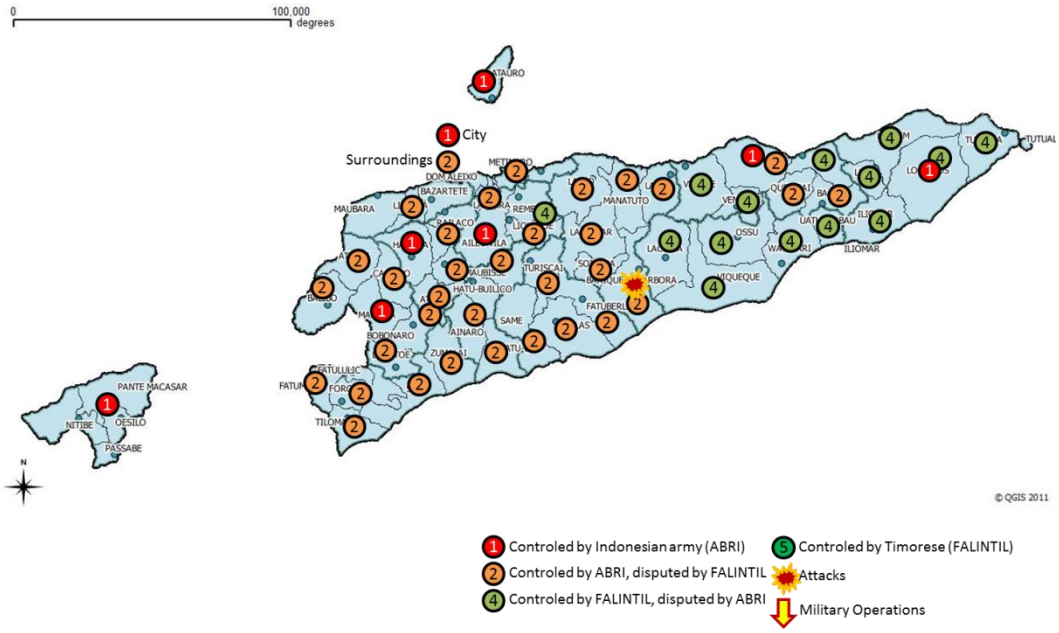
Figure 26: 1986



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

Although there is a visit of a Canadian Parliamentary delegation to Dili and Lospalos, there are no significant references that suggest that the Indonesian military operations of 1986 led to a significant change in the balance of territorial control in 1987. It was, nonetheless, a year with fewer events reported, except for a Resistance incursion in Barique, district of Manatuto, in the border of zones of control.

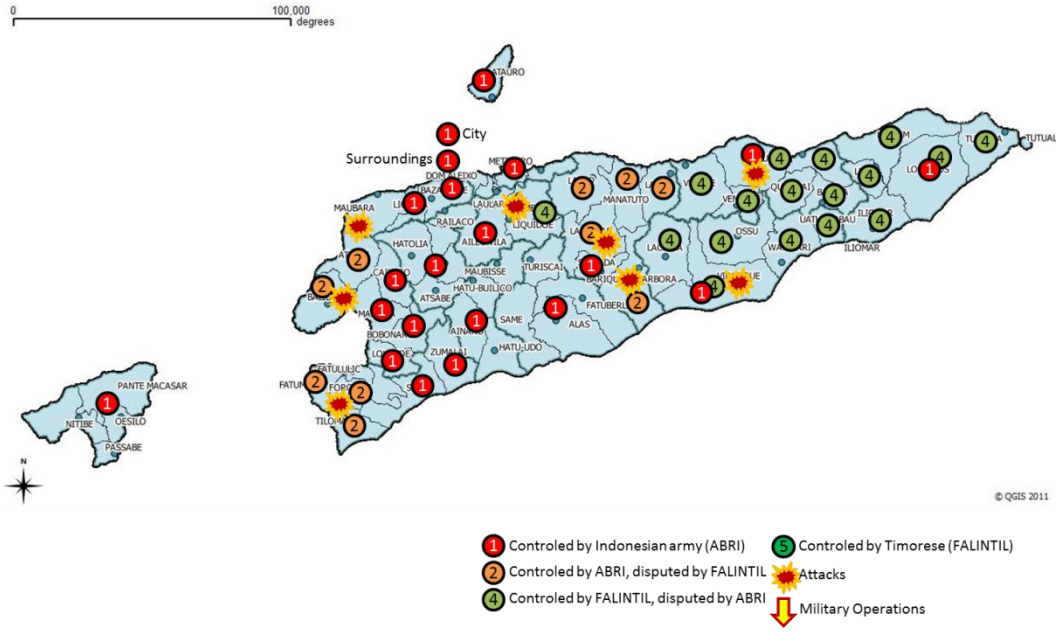
Figure 27: 1987



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

In 1988, the events of violence perpetrated by the Resistance in most sub-districts in the west ceased to be reported. The assumption is that full control by the Indonesian was acquired there. The contestation in the east and southeast continued.

Figure 28: 1988

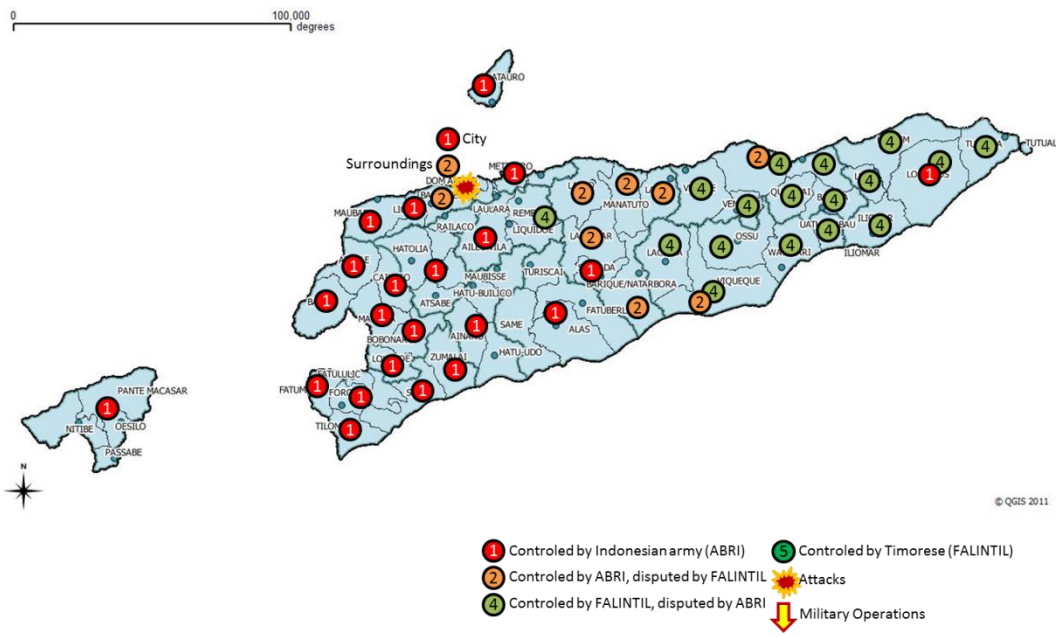


Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

The year of 1989 showed reports of more contestation by the Resistance of areas under Indonesian control, particularly in some cities. There are indications of some weakening

of control particularly in cities controlled by the ABRI, in sub-districts where the Resistance held more control.

Figure 29: 1989



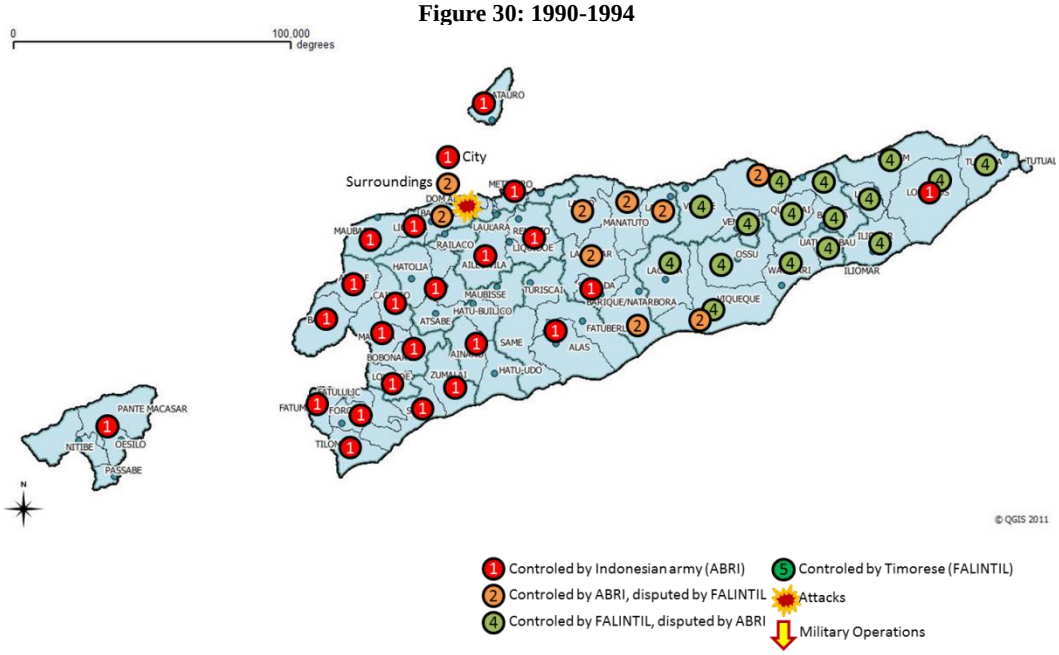
Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

From 1990 to 1994 a lack of reports suggest, again, a consolidation of positions in each area of Timor-Leste. In this period, however, an event showed that even in areas under strong Indonesian control, such as the capital, the clandestine movement was building pressure on the occupier. During a burial procession of a student activist turned demonstration, in the 12th of November 1991, anti-Indonesia banners were used by the demonstrators. In response, a massacre of the participants ensued.

The Santa Cruz Massacre was to become symbolic as it was filmed[107] and broadcasted throughout the word, shedding away the illusion purported by the Indonesian diplomacy, that no violence was being used by their forces and only a few rebels opposed Timorese integration.

[107] A copy of the footage can be seen online in Stahl (1991)

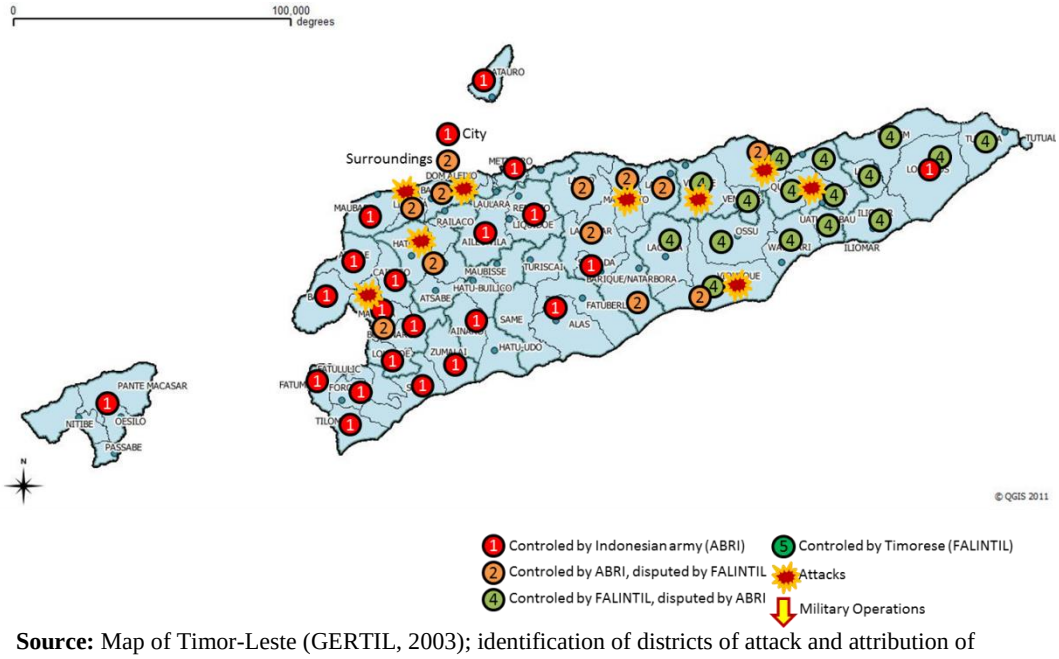
Figure 30: 1990-1994



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

As the international opposition to the Indonesian occupation mounts, the reports shown for the period 1995-1996 are more of selective violence, with executions and arrests in particular regions. At the same time, the Resistance appears to be pushing west, attacking in Manatuto (central region) but also in Ermera and Maliana (western region, the later a border district).

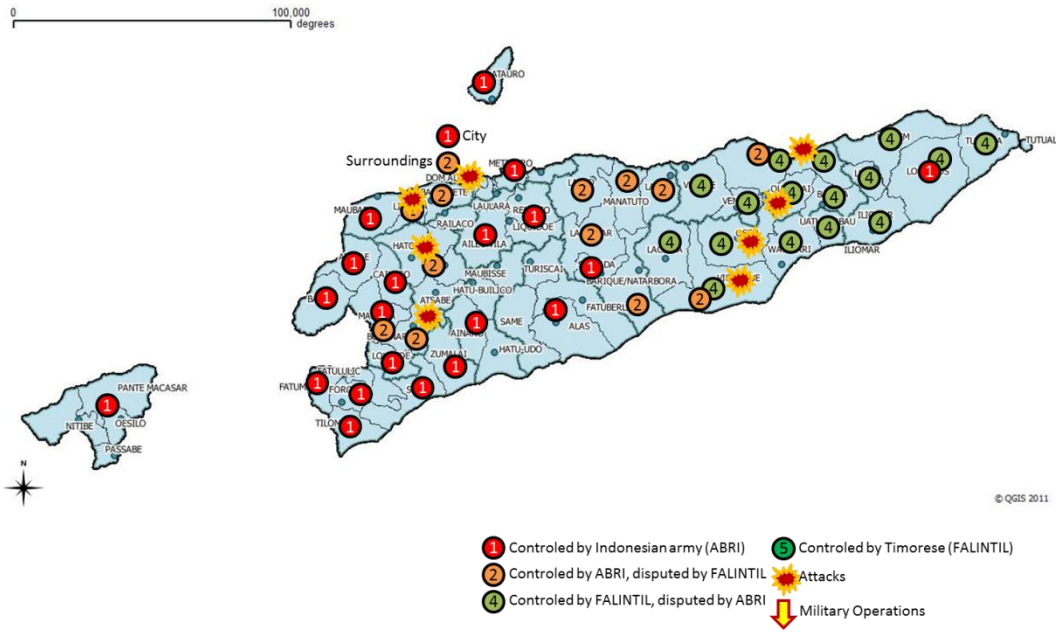
Figure 31: 1995-1996



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

In 1997, again the actions appear more indiscriminate by the Indonesian army, while in areas controlled by the Resistance the attempts to hold election were met by the destruction of the polling stations.

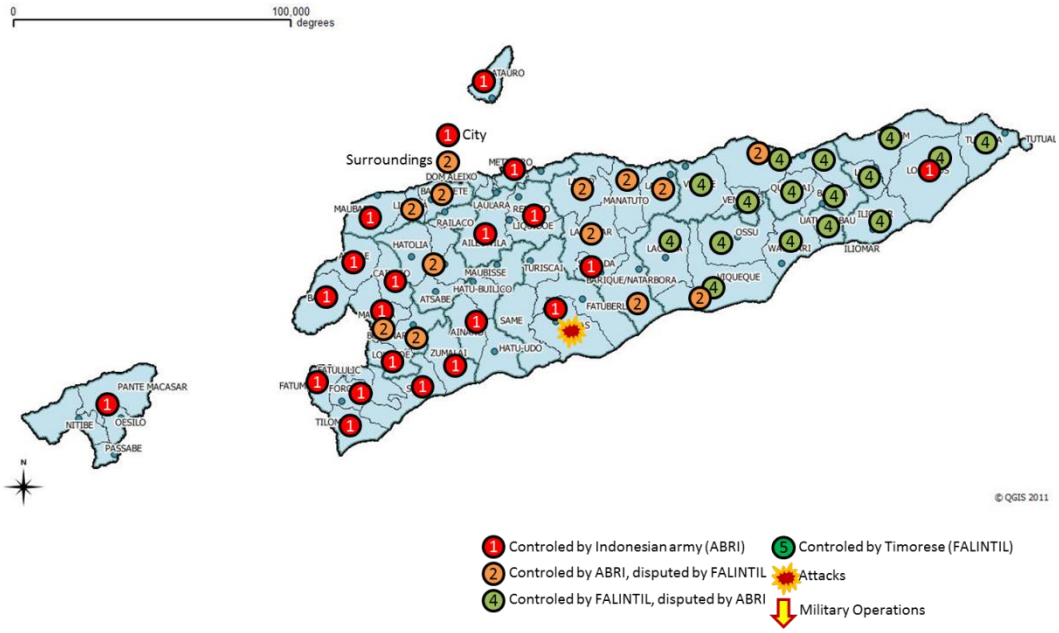
Figure 32: 1997



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

In 1998, demonstrations in Dili congregate people from various districts: Ermera and Liquiça from the West, Laga sub-district of Manatuto from the Centre and Baucau from the East, suggesting stronger Resistance claims in these territories. On the other hand, in preparation of the 1999 referendum, pro-Indonesia militia action began to be reported in the district of Manufahi.

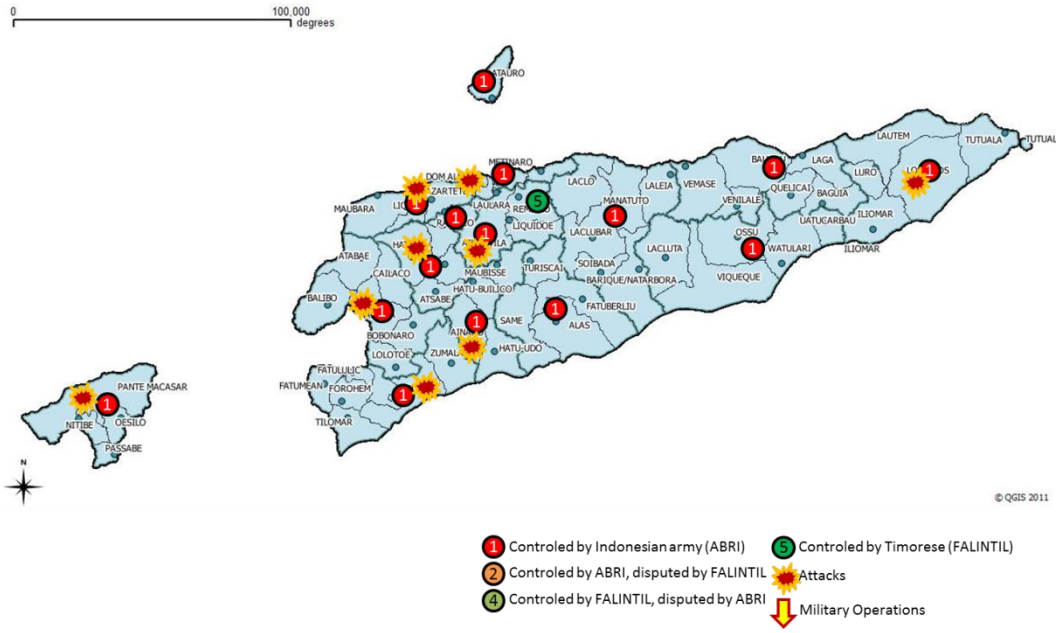
Figure 33: 1998



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

The year of 1999 is a particular one. Under the referendum negotiations, the Resistance accepts to have their forces cantoned in Remexiu, district of Aileu. This puts ABRI in full control of the territory and the pro-Indonesia militias loses to enact a full range of acts of both selective and indiscriminate violence. These culminated with the arson of schools and other public buildings and residential houses, killings and forced displacement in the wake of the referendum results and the victory of the pro-Independence vote.

Figure 34: 1999



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

3- Grid of attribution of control per year and district

The sequential reading of the events of occupation, as they were documented by Taylor (1999, 1990) and CAVR (2005), through the lens provided by the framework of typology of political control proposed by Kalyvas (2006) allows the construction of a grid of attribution of control, per year and district.

In each year, the events reported are used to evaluate if a change in control existed. When in a year different events suggest different levels of control, the following rule applied: if events in the next year indicate that the level of control suggested by the most recent events prevailed, this level of control is accepted; if no event in the next year indicate that the later event induced a change of control, the type of control suggested by the first events of the year are assumed to be the one that prevailed.

As it was seen in the discussion above (also see Table 50 below) the attribution shows significant heterogeneity between the histories of political control in each district

throughout the more general history of Indonesian occupation of the small half-island of Timor-Leste.

Table 50: Attribution of type of control zone in each district and year, during Indonesian occupation

District	75	76	77	78	79	80	81	82	83	84	85	86	87
Aileu	2	2	2	2	2	2	2	2	2	2	2	2	2
Ainaro	5	4	2	4	4	2	2	2	2	2	2	2	2
Baucau	2	2	2	2	2	4	2	2	4	4	4	2	2
Bobonaro	2	2	2	2	2	2	2	2	2	2	2	2	2
Cova Lima	4	2	2	2	2	2	2	2	2	4	2	2	2
Dili	2	2	2	4	4	2	2	2	2	2	2	2	2
Ermera	4	2	2	4	4	2	2	2	2	2	2	2	2
Lautém	5	4	4	4	4	4	2	2	4	4	4	4	4
Liquiçá	2	2	2	4	4	2	2	2	2	2	2	2	2
Manufahi	4	4	4	4	4	2	2	2	2	4	2	2	2
Manatuto	2	2	2	2	2	4	2	2	2	2	2	2	2
Oecusse	2	1	1	1	1	1	1	1	1	1	1	1	1
Viqueque	4	4	4	4	4	4	2	2	4	4	4	4	4

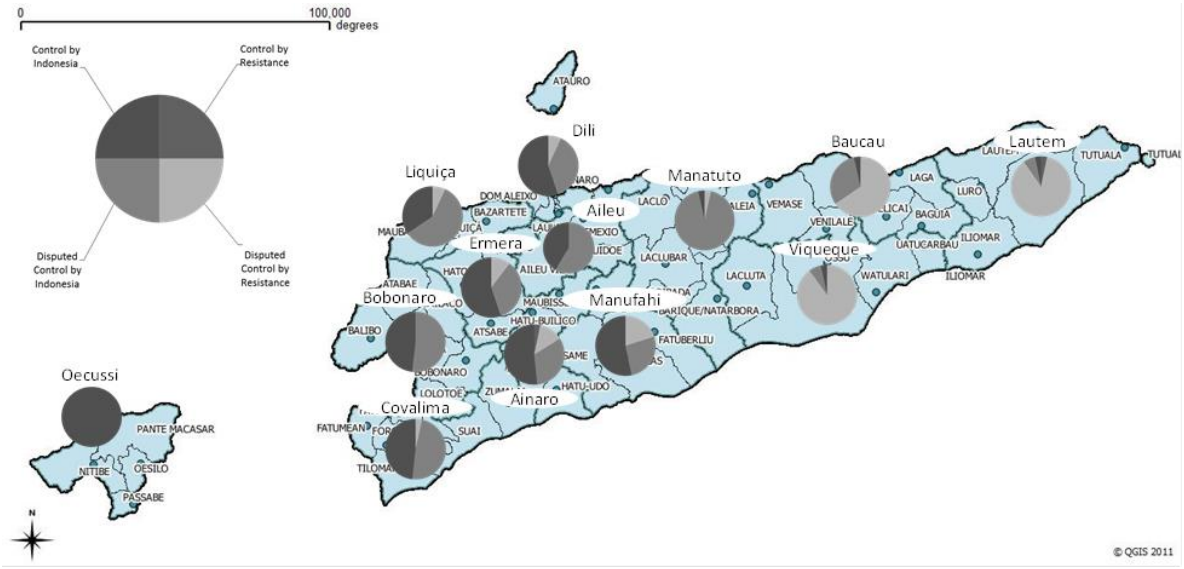
District	87	88	89	90	91	92	93	94	95	96	97	98	99
Aileu	2	2	2	1	1	1	1	1	1	1	1	1	1
Ainaro	2	1	1	1	1	1	1	1	1	1	1	1	1
Baucau	2	4	4	4	4	4	4	4	4	4	4	4	1
Bobonaro	2	2	1	1	1	1	1	1	1	1	1	1	1
Cova Lima	2	2	1	1	1	1	1	1	1	1	1	1	1
Dili	2	1	1	1	1	1	1	1	1	1	1	1	1
Ermera	2	1	1	1	1	1	1	1	1	1	1	1	1
Lautém	4	4	4	4	4	4	4	4	4	4	4	4	1
Liquiçá	2	1	1	1	1	1	1	1	2	2	2	2	1
Manufahi	2	1	1	1	1	1	1	1	1	1	1	1	1
Manatuto	2	2	2	2	2	2	2	2	2	2	2	2	1
Oecusse	1	1	1	1	1	1	1	1	1	1	1	1	1
Viqueque	4	4	4	4	4	4	4	4	4	4	4	4	1

Source: Attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

As seen in other chapters of the thesis, this heterogeneity correlates with the levels of intensity of violence experienced by the Timorese, depending on when and where they were living at any given time. A summary of the heterogeneity is presented in Figure 35 below.

In the concluding section, a brief discussion is presented on possible application of this small dataset in the analysis of conflict in Timor-Leste.

Figure 35: Timor-Leste 1975-1999 - Proportion of years under different types of control



Source: Map of Timor-Leste (GERTIL, 2003); identification of districts of attack and attribution of control by the author following Kalyvas (2006), CAVR (2005) and Taylor (1999, 1990).

4- Discussion and conclusion

Following the framework and classification of zones of control proposed by Kalyvas, (2006) and historical reports on the Indonesian occupation of Timor-Leste, a small dataset was created. In this dataset, for each Timorese district and each year of the Timorese conflict a classification of the level of control held by the contending forces was attributed. The attribution respects the following typology: zone 1 if the district was fully controlled by Indonesian forces; zone 2 if under a contested control by those forces; zone 4 if under a contested control by the Timorese Resistance; zone 5 if fully controlled by these forces.

This territorial status is expected to correlate with particularly different strategies of action by both of the contenders, incumbent and insurgents, in this case Indonesia (incumbent-like) and the Timorese Resistance (insurgent-like). These encompass conditions of provision of public services, starting from security but branching into others that include education, as found in other settings by Kalyvas (2006), Mampilly

(2011) and Arjona (2010), seeking to build differently strengthened social contracts. That provision is not only sought to be assured by the incumbent, but also by the rebels (or insurgents) who seek to provide levels of governance that assure the cooperation or co-optation of the civilians in the territories they aim to fully control. Following this research, there is an indication that, while the incumbents seek to provide services even in areas controlled by the insurgents, the quality of provision is likely to decrease from zone 1 to zone 3 (here being the lowest expected) and to possibly increase in zones 4 and 5 if an agreement exists between the two sides in contention, as found by Mampilly (2011). The interviews conducted in Timor suggest a lack of such agreement between Indonesia and the Timorese Resistance, as the teaching in Indonesian language was perceived as indoctrination, an assessment also confirmed by Millo and Barnett (2004). The only type of education the Resistance was able to put into place, described by older interviewees was a form of popular education (literally using the bark of trees as "backboards" and coal as "chalk") tantamount to basic literacy training. This strategy of popular education is described by Hill (2002). This may determine the quality of education beyond effects of violence. As the quality of provision of education by the Indonesian incumbent-like actor was to reduce in areas where the Resistance held more control (or for longer), the qualifications of most of the residents were less likely to reach average levels. This could, in turn, hurt their labour market opportunities. On the other hand, a possible "loyalist" effect could become evident, benefiting those that lived the longest in districts controlled by the Resistance.[108]

The political dimension of the conflict may also affect behaviour of political actors in the post-conflict setting, including the new government and international aid agents and NGOs. Post-conflict reconstruction projects may target those areas that were known to

[108] The empirical research on post-conflict returns to education in this thesis suggests that not to be the case.

have been under dispute for longer, allowing those residing there to participate in the formal post-conflict labour market.

This discussion supported the empirical testing of the indicators of political control generated, in the studies of this thesis. These indicators can also be used, potentially, in the analysis of households' behaviour and collective action during the conflict, using the SUSENAS datasets of the Indonesian Bureau of Statistics, and following the insights of research such as Gáfaro et al. (2014) on Colombia. This is, however, a subject of future research.

5- Chronology of events and classification of control following Kalyvas (2006)

1975

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
1	1	5	6	6	1975	Indonesian troops enter Oecusse	ABRI			Oecusse		2	
2	1	6	6	10	1975	Indonesian troops attack Batugade	ABRI			Bobonaro	Batugade	4	
3	1	6	6	10	1975	Batugade falls	ABRI			Bobonaro	Batugade	2	
4	1	6	16	10	1975	Journalists are killed at Balibo	ABRI			Bobonaro	Balibo	2	
5	1	7	26	11	1975	Atabae is taken by the Indonesian troops	ABRI			Bobonaro	Atabae	2	
6	3	60	28	11	1975	Indonesian troops already reported in Timor Leste	ABRI		West			4	
7	3	60	2	12	1975	Foreign journalists advised to leave Dili by Australian government				Dili		5	
8	3	62	6	12	1975	Full scale attack upon Dili. Some Fretilin forces stayed to defend Dili, controling Taibesi, Lahane, Fathada and the foothils of Comoro.	ABRI	Resistance		Dili		4	
9	3	62	6	12	1975	Fretilin leadership fled to Aileu	Resistance			Aileu		5	
10	1	7	7	12	1975	Formal Invasion of East Timor	ABRI		-	-	-	-	
11	3	65	7	12	1975	Dili is reported to have fallen. Massacre of civilians in Caicoli, Dili	ABRI	Resistance		Dili		2	
12	3	65	9	12	1975	Baucau is occupied. Invasion happened through Laga.	ABRI	Resistance		Baucau	Baucau, Laga	2	
13	1	7	25	12	1975	15 to 20 thousand Indonesian troops estimated in Timor Leste	ABRI		-	-	-	-	
14	3	70	31	12	1975	Indonesian troops overrun Aileu.	ABRI	Resistance		Aileu		2	
15	3	70	31	12	1975	From Baucau, Manatuto is captured and then ABRI forces proceed to Soibada	ABRI	Resistance		Manatuto	Manatuto, Laclubar, Soibada	2	
16	3	68	-	12	1975	Fretilin leadership reported to have fled to Maubisse	Resistance			Ainaro	Maubisse	5	

1976

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
17	1	9	13	1	1976	Dili, Baucau and border region occupied	ABRI			Dili, Baucau, Bobonaro, Covalima		2	
18	3	68	-	1	1976	Fretilin leadership reported to have fled to Same	Resistance			Manufahi	Same	5	
19	3	70	-	1	1976	ABRI controled Maubisse and was fighting for control of Fleixa Pass	ABRI	Resistance		Ainaro	Maubisse	2	
20	3	70	-	1	1976	ABRI reached Bobonaro, Atsabe and the Letefoho	ABRI	Resistance		Bobbonaro, Ermera	Bobonaro, Atsabe, Lete Foho	2	
21	3	70	-	1	1976	Offensive strikes from Baucau towards Viqueque meeting there a force that landed in Uatu-Lari	ABRI	Resistance		Baucau Viqueque		2 4	
22	3	70	-	1	1976	Attack on Fretilin forces in the foothills of Mount Matebian	ABRI	Resistance		Baucau	Quelicai Baguia	4	
23	3	70	2	2	1976	Parachute attack over Lospalos	ABRI	Resistance		Lautem	Lospalos	4	
24	3	70	5	2	1976	ABRI forces parachuted into Suai and advanced east toward Zumalai.	ABRI	Resistance		Covalima	Suai Zumalai	4	
25	1	9	14	2	1976	Lopes da Cruz claims 60 thousand Timorese have been killed since the invasion			-	-	-	-	
26	3	70	23	2	1976	ABRI reached Ainaro. Already had landed at Betano	ABRI	Resistance		Ainaro Manufahi	Ainaro Same	4 4	
27	3	70	27	3	1976	ABRI reached Ermera	ABRI	Resistance		Ermera		4	
28	1	9	3	4	1976	A revolt by UDT in Dili is suppressed	Resistance	ABRI		Dili	Dili	1	
29	1	9	15	5	1976	A conference of Fretilin is held in the Central Region of East Timor	Resistance		Central			5	
30	1	9	15	5	1976	Attack by Fretilin forces at Baucau. Fretilin forces said to be active outside main towns (Dili, Baucau)	Resistance	ABRI		Dili Baucau	Dili Baucau	2	
31	3	71	15	5	1976	Fretilin's National Conference starts in Soibada ending in the 2nd of June.	Resistance			Manatuto	Soibada	5	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
32	3	70	-	6	1976	ABRI attacked Liquiça and Maubara before proceeding to Ermera	ABRI	Resistance		Liquiça Ermera	Liquiça Maubara Eremera	4	
33	1	10	26	8	1976	Increase in the numbers of ABRI military in the South			-	-	-	-	
34	1	10	26	8	1976	Fretilin forces recapture Alas. Heavy attacks in Eastern and Southern Sectors	Resistance	ABRI		Manufahi	Alas	4	
35	3	70	-	8	1976	ABRI established 4 operational sectors: Sector A - Dili and Oecusse Sector B - West: Liquiça, Bobonaro, Ermera and Covalima Sector C - Center: Aileu, Ainaro, Manufahi and Manatuto Sector D - East: Baucau, Viqueque and Lautem	ABRI		-	-	-	-	
36	3	73	-	8	1976	Attack by ABRI on Mount Lakirin and Mount Fohorua (near Suai) and Lela (a Fretilin base at the time)	ABRI	Resistance		Suai	Suai Maukatar	4	?
37	1	10	24	10	1976	Heavy fight in Bobonaro, Suai, Dili and Baucau	Resistance	ABRI		Bobonaro Suai Dili Baucau		2	
38	1	10	11	11	1976	Indonesian relief worker reports 100.000 people killed			-	-	-	-	
39	1	10	22	12	1976	Fretilin recaptures Remexio	Resistance	ABRI		Aileu	Remexio	4	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
40	3	73-74	-	12	1976	ABRI is reported to have limited control over: corridor from Dili to Ainaro and Betano, corridor Baucau-Viqueque, corridor Manatuto-Laclubar, corridor Lautém-Tutuala, areas reacheable by road along the north coast.	ABRI			Various	1) Dili, Laulara, Aileu, Maubisse, Hatu Bulico, Ainaro, Hatu Udo 2) Baucau, Fatu Maka, Venilale, Ossu, Viqueque 3) Manatuto, Laclubar 4) Balibo; Atsabe; Maubara; Liquiça; Bazartete; Dom Aleixo; Vera Cruz; Nain Feto; Cristo Rei; Metinaro; Laclo; Manatuto; Laleia; Vemasse; Baucau; Laga; Lautem ; Tutuala.	2	
41	3	73-74	-	12	1976	Large areas of the interior still remained beyond ABRI control	Resistance				Rest of Timor	5	
42	3	71	-	-	1976	Fretilin's maize plantations reported at Laclo, Manatuto	Resistance			Manatuto	Laclo	5	

1977

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
43	1	13	17	4	1977	Fretilim forces report heavy Indonesian offensive south-west of Baucau, Remexiu and Bobonaro. Shelling in the outskirts of Dili	ABRI	Resistance		Various	1) Fatu Maka, Vemasse, Venilale, Ossu, Viqueque, Lacluta; 2) Lequidoe, Maubisse, Hatu Bulico, Same, Ainaro, Hato Udo, Zumalai	4	
44	1	14	7	5	1977	Fretilin reports control over 80% of territory			-	-	-	-	-
45	1	14	7	5	1977	Heavy bomb raids on Bobonaro. Long military engagement in Quelicai	ABRI	Resistance		Bobonaro Baucau	Bobonaro Quelicai	4	
46	3	75	-	6	1977	ABRI campaigns intensify, including attacks to food sources	ABRI	Resistance	-	-	-	-	-
47	3	77	-	8	1977	ABRI claims control over route between Quelicai and Uatu-Carbau	ABRI	Resistance		Baucau Viqueque	Quelicai Baguia Uatu Carbau	2	
48	1	14	23	9	1977	East Timorese are reported being emprisoned on Atauro Island	ABRI			Dili	Atauro	1	
49	1	14	13	11	1977	Large scale Indonesian offensive in southern border region	ABRI	Resistance		Covalima	Fatumean Fato Lulik Fohorem Tilomar	4	
50	3	75	-	-	1977	Bombardment of Mount Matebian, Ermera and Suai starts. This are reported to end only in 1979 (Matebian)	ABRI	Resistance		Baucau Ermera Suai	Quelicai Baguia Ermera Suai	4	
51	3	77	-	-	1977	Fretilin executes liurai of Quelicai. Breakaway unit in Iliomar was arrested and executed. Meeting of Fretilin Central Commettee in Laline, Lacluta, district of Viqueque	Resistance			Baucau Lautem Viqueque	Quelicai Iliomar Lacluta	4 4 5	

1978

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
52	1	17	27	1	1978	Heavy fighting in the south-west border area	ABRI	Resistance		Covalima	Fatumean Fato Lulik Fohorem Tilomar	4	
53	1	17	4	3	1978	Encirclement campain beggins in the south-west of island	ABRI	Resistance		Covalima Ainaro Manufahi		4	
54	1	17	26	5	1978	Indonesian bombing campaign in north-west region and south of Dili	ABRI	Resistance		Bobonaro Ermera Liquiça Aileu Ainaro Manufahi		4	
55	1	17	1	6	1978	Intense fighting in border areas, central northern and central-southern sector and eastern region	ABRI	Resistance	-	-	-	-	-
56	1	17	2	6	1978	Attack on Remexio. Encirclement with areal and naval bombardment against areas surrounding Turiscai, Betano, Laklubar and Soibada	ABRI	Resistance			Remexio Turiscai Hatu Udo Laklubar Soibada	4	
57	1	18	18	6	1978	Advances of Indonesian troops in North-Central Sector	ABRI	Resistance		Aileu Manatuto		4	
58	1	18	22	6	1978	Advance of Indonesian troops on Quelicai and Maliana. Troops land near Lospalos	ABRI	Resistance		Baucau Bobonaro Lautem	Quelicai Maliana Lospalos	4	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
59	3	79	-	6	1978	ABRI starts an attack over the Same-Kablaki-Fatuberliu area	ABRI	Resistance		Manufahi	Same Fatuberliu	4	
60	3	79	-	6	1978	ABRI attacks Fretilin strongholds in the Baucau-Viqueque border, between Mount Ossoala and Mount Mundo Perdido, and continued attack on the foothils of Mount Matebian	ABRI	Resistance		Baucau Viqueque	Venilale Ossu	4	
61	3	79	-	6	1978	Bombings reported in Kablaki, Dululau and Manelau.	ABRI	Resistance		Ainaro	Hatu Bulico	4	
62	3	79	-	6	1978	Attack in Dolok	ABRI	Resistance					?
63	1	18	18	7	1978	Suharto visits Dili and Maliana	ABRI			Dili Bobonaro	Dili subdistricts Maliana	1	
64	1	18	3	8	1978	Indonesian offensives against Lacluta and Iliomar	ABRI	Resistance		Viqueque Lautem	Lacluta Iliomar	4	
65	1	18	30	8	1978	Remexio is taken by Indonesian troops	ABRI	Resistance		Aileu	Remexio	2	
66	1	18	5	9	1978	Indonesian attack on Alas	ABRI	Resistance		Manufahi	Alas	4	
67	1	18	7	9	1978	Ambassadors visit Dili, Baucau, Maliana, Remexio	ABRI			Dili Aileu Bobonaro	Dili subdistricts Remexio Maliana	1	
68	1	18	21	9	1978	Intense fighting on South coast	ABRI	Resistance	-	-	-	-	-
69	1	18	30	9	1978	14000 Timorese displaced (living in displacement camps)			-	-	-	-	-
70	1	18	21	10	1978	Australia Intelligence Service reports that Fretilin still controls most of Timor-Leste			-	-	-	-	-
71	3	81	22	11	1978	Mount Matebian falls into ABRI control	ABRI	Resistance		Baucau	Quelicai Baguia	2	
72	3	94	7	12	1978	Xanana Gusmão goes to Mehara	Resistance			Lautem	Tutuala	4	
73	1	19	29	12	1978	According to the Far Eastern Economic Review, there are 165.835 displaced Timorese			-	-	-	-	-
74	3	94	-	12	1978	There are no longer any "zona libertada" ie, areas under full control of Fretilin. At that time, 300.000 people are said to have surrendered.	Resistance						Where control is 5 turn into 4
75	3	94	-	12	1978	There is a small Fretilin group regrouped in the Legumau northern range east of Baguia	Resistance			Baucau	Baguia	4	

1979

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
76	1	30	-	-	1978	Reports of bombing of Mount Matebian (reports produced on 30-12-1980)			-	-	-	-	Reports to event 71
77	3	81	-	1	1979	ABRI starts to focus on Fatubesi (Ermera) and Mount Kablaki, following the Ainaro-Manufahi border and the Dilor river valley.	ABRI	Resistance		Ermera Ainaro Manufahi	Hatolia Hatu Bulico Same	4	
78	3	81	-	1	1979	ABRI operations in Manatuto	ABRI	Resistance		Manatuto	Manatuto	4	
79	3	81	-	1	1979	Units that took Mount Matebian moved from Baucau into Lautém.	ABRI	Resistance		Lautém		4	
80	3	81	-	2	1979	Fretilin leader of Eastern region is captured and killed.	ABRI	Resistance	-	-	-	-	?
81	1	21	22	3	1979	Fighting in Alas	ABRI	Resistance		Manufahi	Alas	4	
82	3	95	-	3	1979	Xanana's group was attacked by Indonesian military near Remexio and had to return to Mehara	ABRI	Resistance		Aileu Lautém	Remexio Tutuala	2 4	
83	3	95	-	3	1979	Three Fretilin companies were eliminated near Loré, Lautém	ABRI	Resistance		Lautém	Iliomar	2	
84	3	95	-	3	1979	Resistance members were reunited, coming form Laline, Uaimori, Matebian, Manatuto, Same, Ainaro and near Dili. Mau-Hunu reported to be in Lospalos	Resistance		-	-	-	-	?
85	3	95	-	3	1979	Contacts established with civilians to create clandestine movements in Indonesian controled territories.	Resistance	ABRI	-	-	-	-	
86	1	21	2	4	1979	International Red Cross concludes that displaced in ressetlement camps are facing deprivation			-	-	-	-	
87	1	21	9	4	1979	14.000 people in Dili apply for repatriation in Portugal when that is allowed during 2 days			-	-	-	-	
88	1	22	28	6	1979	People reported of being dying slowly of famine and deprivation in Turiscai, Maubara and Betano	ABRI	Resistance	-	-	-	-	
89	1	23	22	12	1979	Mochtar Kusumaatmadja admists that only half of the Timorese population is under Indonesian control and that 120.000 have been killed since 1975			-	-	-	-	

1980

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
90	1	25	10	3	1980	Resistance reported from the north-central region	Resistance			Aileu Manatuto	Subdistricts of Aileu Laclo, Manatuto, Laleia	4	
91	1	25	10	5	1980	Reemergence of Fretilin in the East	Resistance			Baucau Viqueque Lautém		4	Rest of country are 2 or 1
92	1	25	13	5	1980	150 ressetlement camps reported			-	-	-	-	
93	1	25	22	5	1980	Letters describe armed conflict in the Eastern region				Aileu Manatuto	Subdistricts of Aileu Laclo, Manatuto, Laleia	4	
94	1	26	17	6	1980	Fretilin forces attack Dili	Resistance	ABRI		Dili		2	
95	3	89	-	6	1980	Attack by Fretilin in Dili	Resistance	ABRI		Dili		2	

1981

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
96	1	29	25	3	1981	Indonesian exercises held in Baucau, Lospalos and Laga	ABRI			Baucau Lautem	Baucau, Laga Lospalos	2	1?
97	3	96	-	3	1981	Resistance holds "National Reorganization Conference" in Maubai, Lacluta, district of Viqueque. - Clandestine movement structure created, with district level resistance centers (cernak) and small village level cells with 4to 7 people (nurep). - Military struture divided in 3 regions: eastern ("funu sei nafatin" - the fight still goes on), center ("nakroman" - light) and border ("haksolok" - happiness).	Resistance			Viqueque	Lacluta	4	5?
98	1	29	1	6	1981	Students from Baucau, Laclo and Manatuto report of a new Indonesian offense, Operation Keamanan (fence of legs)	ABRI	Resistance	-	-	-	-	
99	3	91	-	-	1981	Major operations of "fence of legs" in sector D: - A line formed, starting from Tutuala and creating a human fence linking Com-Raca-Lospalos-Iliomar - A second line began from Venilale-Ossu-Viqueque towards the northeast - The two lines were to converge on Mount Matebian - A final phase tried to force Fretilin soldiers into Lacluta, Viqueque. There a massacre occurred.	ABRI	Resistance		Lautem Baucau Viqueque		2	

1982

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
100	1	33	11	1	1982	Massacre reported near Lacluta (500 people reported killed)	ABRI	Resistance		Viqueque	Lacluta	2	
101	1	33	-	2	1982	Severe food shortages reported			-	-	-	-	
102	1	33	4	3	1982	ICRC reports 4000 Timorese emprisoned in Atauro			-	-	-	-	
103	1	33	5	3	1982	Visit of Australian Prime Minister to Maliana, Ermera, Natarbora, Dilor, Luro, Suai and Atauro	ABRI	ABRI		Bobonaro Ermera Manatuto Lautém Cova Lima Dili	Maliana Ermera Barique Luro Suai Atauro	5	
104	1	35	-	6	1982	Fretilin attacks on Indonesian forces in Suai, Lacluta, Lospalos, Uato Lari, Same, Uato Carbau, Viqueque, Loro, Bobonaro	Resistance	ABRI		Cova Lima Lautém Viqueque Manufahi Bobonaro	Suai Loro Lospalos Lacluta Uato Lari Uato Carbau Viqueque Same Bobonaro	2	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
105	3	101	-	8	1982	Attack on Indonesian post is Mauchiga, Ainaro	Resistance	ABRI		Ainaro	Ainaro	2	
106	1	35	28	10	1982	Fretilin attacks on the districts of Viqueque and Lospalos	Resistance	ABRI		Viqueque Lautem		2	
107	1	36	-	11	1982	Reports of attacks in Outskirts of Dili and battles in Same, Ainaro, Lospalos, Ossu, Matebian and Viqueque	Resistance	ABRI		Dili Manufahi Ainaro Lautém Viqueque Baucau	Dili Same Ainaro Lospalos Ossu Viqueque Baguia Quelicai	2	
108	3	100	-	-	1982	Indonesian elections in Viqueque subdistrict have to be restricted to the town of Viqueque due to lack of control in remaining area.	Resistance	ABRI		Viqueque		4	

1983

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
109	1	40	27	3	1983	Heavy fighting reported in Lospalos area	Resistance	ABRI		Lautém	Lospalos	3	?
110	1	40	30	3	1983	Resistance said to have 4.000 individuals			-	-	-	-	-
111	3	102	-	3	1983	Meetings of ABRI with Xanana Gusmão in Liaruka, Buburaka, Ossu, Viqueque and, after, near Larigutu, Veninale, Baucau	Resistance			Viqueque Baucau	Ossu Venilale	4	
112	1	40	25	6	1983	Ceasefire signed			-	-	-	-	-
113	1	41	29	7	1983	Members of an Australian parlamentary delegation are intercepted by Fretilin soldiers on the road from Lospalos to Baucau, east of Laba (a ressetlement village in Soelai is occupied by Fretilin)			-	-	-	-	-

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
114	1	41	8	8	1983	Indonesian forces break the ceasefire			-	-	-	-	-
115	1	41	16	8	1983	Fretilin forces attack the military section of Dili airport				Dili		2	
116	1	41	21	8	1983	200 to 300 people are executed in Kraras near Viqueque, after a number of Indonesian soldiers were killed by Fretilin and villagers	ABRI	Resistance		Viqueque	Lacluta	4	?
117	1	81	-	8	1983	At 15-8-1988 there was knowledge of reports to 7 people arrested in Aileu for suspicion of having suppied information to ICRC	ABRI	Resistance		Aileu	Aileu	1	?
118	3	100	-	8	1983	Ceasefire broken in Kraras (Lacluta, Viqueque) with an attack by Falintil and Timorese Hansip against Indonesian soldiers, killing 12 troops, and ensuing massacre pursued by ABRI as reprisal.	Resistance	ABRI		Viqueque	Lacluta	4	Same as event nb. 116
119	3	105	-	8	1983	After the ceasefire was broken, ABRI focused attacks on the east	ABRI			Baucau Viqueque Lautém		4	
120	1	41	7	9	1983	State of Emergency declared in East Timor			-	-	-	-	-
121	1	41	14	9	1983	Indonesia reported to have 30.000 to 50.000 troops in East Timor			-	-	-	-	-
122	1	41	17	9	1983	Curfew reported in Dili				Dili		2	
123	1	43	19	10	1983	500 members of the civil guard (Hansip) defected to Fretilin	Resistance		-	-	-	-	-
124	1	43	29	12	1983	East Timor is still described as a "continuing security problem"			-	-	-	-	-
125	3	97	-	-	1983	Defection to FALINTIL of several hundered Timorese members of Hansip in Viqueque.	Resistance			Viqueque		4	
126	3	100	-	-	1983	Ceasefire signed			-	-	-	-	Same as event nb. 112

1984

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
127	1	45	18	1	1984	12.000 Indonesian troops advancing from Baucau to Viqueque.	ABRI	Resistance		Baucau Viqueque	-	2 4	
128	1	45	18	1	1984	Fretilin's counter-ffensive attacking the central and border sectors and the south coast.	Resistance	ABRI	West Central			2	
129	1	45	28	1	1984	ABRI troops deployed in a line from Baucau to Viqueque and pushing eastward	ABRI	Resistance		Baucau Viqueque Lautém		2 2 4	
130	1	45	10	2	1984	Reports of bombing of areas in the east	ABRI	Resistance		Baucau Viqueque Lautém		4	
131	1	45	27	6	1984	Atrocities reported in Remexio	ABRI	Resistance		Aileu	Remexio	4	
132	1	51	-	7	1984	A letter is reported in 12 February 1985 reporting Fretilin attacs on Lacluta in the June 1984	Resistance	ABRI					
133	1	49	8	11	1984	Naval bombardment of the South coast of East Timor. Fretilin troops moved to this area to avoid "fence of legs"	ABRI	Resistance	-	-	-	-	
134	1	49	17	12	1984	General Murdani states that the East Timor conflict "will take time to resolve"			-	-	-	-	

1985

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Information obtained from documental sources							Researcher's Interpretation						
135	1	52	5	3	1985	A report states that: Indonesia is to establish a sugar mill in Lospalos; strong Indonesian military presence in Baucau; 3/4 of prisoners in Atauro are from Viqueque.	ABRI		-	-	-	-	
136	1	54	10	7	1985	A journalist is not allowed to visit Baucau because it is deemed "unsafe"	ABRI			Baucau	Baucau	2	
137	1	55	10	9	1985	A Fretilin's document is produced on the areas controled in de Eastern Sector of the country	Resistance		-	-	-	-	
138	1	57	12	12	1985	Groups of Indonesian soldiers reported to have been ambushed in the Lospalos and Viqueque areas	Resistance	ABRI		Lautém Viqueque	Lospalos Viqueque	4	

1986

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
139	1	59	20	2	1986	A letter is received reporting fighting in the central and eastern sectors and attempts to capture Fretilin's leadership on Matebian	ABRI	Resistance		Baucau	Quelicai Baguia	2	
140	1	60	18	4	1986	A set of maps is released in Lisbon. They indicate that most Indonesian military activity is occuring east of a line from Baucau to Viqueque	ABRI	Resistance		Baucau Viqueque Lautém		4	
141	1	62	11	8	1986	A Indonesian Government document about economic matters highlights investments in Covalima area.	ABRI			Cova Lima		1	
142	1	63	19	9	1986	Wave of arrests in the eastern area with arested being taken to Baucau	ABRI	Resistance		Baucau	Baucau	1	
143	1	64	6	11	1986	New Indonesian offensive, that started in August, concentrated in the Eastern zone. Security is strenghten in Dili.	ABRI	Resistance		Baucau Viqueque Lautém	other than Baucau subdistrict	4	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
144	1	65	21	11	1986	Fretilin military sucesses reported in all areas but most notably in Viqueque area.	Resistance	ABRI		Viqueque		4	
145	1	65	25	12	1986	Letters received by refugees describe conflicts between Fretilin and ABRI in Viqueque, Suai and Lospalos	Resistance	ABRI		Viqueque Cova Lima Lautém	Viqueque Suai Lospalos	4	
146	3	109	-	-	1986	Around 1986, OJECTIL (Timor-Leste Catholic Youth Organization) was formed by student activits based in Externato S. José in Dili. A similar movement for students abroad (RENETIL - Timor-Leste Student's National Resistance) was estableshed in 1988 in Bali.	Resistance		-	-	-	-	

1987

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
147	1	70	2	5	1987	Governor Carrascalão stressed that unemplyment would soon emerge in East Timor since jobs would not be availlable to all high schools graduates. He proposed: building polytechnic schools, building 20 vocational schools, develop a "mining sector" for marble.			-	-	-	-	
148	1	75	21	11	1987	A Canadian Parlamentary delegation visits Dili and Lospalos	ABRI			Dili Lospalos		5	
149	1	76	22	12	1987	Reports of a Fretilin attack on Indonesian forces near Barique	Resistance	ABRI		Manatuto	Barique	2	
150	1	76	28	12	1987	Appeal by Gen. Murdani for those "in the mountains" to surrender.			-	-	-	-	
151	1	76	30	12	1987	Fretilin forces is of 500 men according to Gen Murdani.			-	-	-	-	

1988

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
152	1	79	4	1	1988	A Portuguese flag is hoisted in Dili during the visit by Gen. Murdani	Resistance	ABRI		Dili		2	
153	1	79	23	1	1988	Anti-Indonesia pamphlets distributed in public buildings in Dili	Resistance	ABRI		Dili		2	
154	1	81	18	2	1988	A prison is being contructed in Maliana	ABRI			Bobonaro	Maliana	1	
155	1	81	9	3	1988	Fretilin infiltrates into Baucau and attacks areas near the western border	Resistance	ABRI					
156	1	83	14	3	1988	Fretilin is said to control 1000 villages in the East and has 1.500 people in arms.	Resistance		-	-	-	-	
157	1	83	20	3	1988	In an Interview in Jakarta, TL, Governor Mário Carrascalão states that Fretilin forces are in the eastern and southeastern areas of TL	Resistance		Central West			1 or 2	
158	1	86	2	7	1988	Governor states that development strategies pursued in East Timor are only providing jobs for Indonesians			-	-	-	-	
159	1	87	10	8	1988	A series of attacks by Fretilin forces are reported in Natarbora, Viqueque, Laclubar, Remexio and outskirts of Baucau	Resistance	ABRI		Manatuto Viqueque Aileu	Natarbora Laclubar Viqueque Remexio	2	
160	1	87	16	8	1988	4 members of the european Parliament travel by helicopter from Dili to Viqueque and to Baucau	ABRI			Dili Viqueque Baucau	Cities	1	
161	1	89	-	8	1988	Report availlable at 24-12-1988: the president of Fretilin was said to have escaped an Indonesian military enciclement on the banks of river Galata near mount Matebian	ABRI	Resistance	-	-	-	-	
162	1	87	31	10	1988	5 girls in agricultural college in Natarbora are reported to have been raped and murdered by Indonesian soldiers	ABRI		-	-	-	-	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
163	1	87	5	11	1988	President Suharto announces that from January 1989 all districts will be opened to entry by Indonesian and foreigners except: Manatuto, Baucau, Viqueque and Lospalos	ABRI			Manatuto Baucau Viqueque Lautem rest of country		2 4 4 4 1	
164	1	89	30	11	1988	ABRI operations, since June, in the areas of Viqueque, Baucau and Lospalos.	ABRI			Baucau Viqueque Lautem		4	
165	1	89	30	11	1988	Approximately 500 students reported to have left the areas of Baucau, Ainaro and Natarbora to join Fretilin.	Resistance			Baucau Ainaro Barique		4 2 2	
166	1	89	12	12	1988	During a visit by President Suharto to Dili, 200 people are arested	ABRI			Dili		2	

1989

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
167	1	93	10	1	1989	Attacks by Fretilin in Dili (Lahane and Taibesse). Desertions are reported.	Resistance	ABRI		Dili		2	
168	1	93	5	2	1989	In a visit to a orphanage in Venilale, a reporter is told that Indonesia soldiers wait there for Fretilin members who come in "from outlying areas" to try and visit children and relatives	ABRI	Resistance		Baucau	Venilale	4	
169	1	93/94	7	2	1989	Armed rebels are reported by the indonesian Interior Minister to still "roam the mountainous areas"	Resistance		-	-	-	-	
170	1	94	7	3	1989	British MPs are not allowed to visit Baucau.	ABRI			Baucau	City	2	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
171	1	94	17	3	1989	A reporter travelling to Viqueque states that security is tight and villagers have been ordered to build walls arround their settlements	ABRI			Viqueque	City	2	
172	2	212	12	10	1989	Pope John Paul II visits Dili	ABRI			Dili	City	1	

1990-1994

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
173	2	213	12	11	1991	St. Cruz Massacre in Dili	ABRI			Dili	City	1	
174	2	214	20	11	1992	Xanana Gusmão is arrested in Lahane, Dili	ABRI			Dili	City	1	
175	2	214	3	4	1993	Ma'Huno, the new FALINTIL commander is captured in Ainaro	ABRI		-	-	-	-	
176	2	215	28	6	1994	In Remexio, 2 soldiers disrespect a Catholic Mass and desecrate the "holy communion"	ABRI			Aileu	Remexio		
177	2	215	31	7	1994	Konis Santan, new Falintil commander offers a unilateral ceasefire	Resistance		-	-	-	-	

1995-1996

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
178	2	216	12	1	1995	Execution of 6 civilians in Liquiça as a reprisal for an attack that happened there.	ABRI			Liquiça		2	
179	2	217	27	7	1995	2 young Timorese men are reported being killed by Indonesian soldiers in the village of Wailakama, region of Vemasse	ABRI		-	-	-	-	
180	2	217	3	8	1995	Killings and disapearences are reported in Quelicai and Baucau.	ABRI		-	-	-	-	
181	2	217	3	8	1995	A local Indonesian commander is seriously injured in Bucoli.	Resistance	ABRI		Baucau	Baucau	2	
182	2	217	8	9	1995	Disturbances reported in Dili, Maliana, Viqueque, Ermera and Manatuto	Resistance	ABRI			Dili Maliana Viqueque Ermera Manatuto	2	
183	2	217	8	9	1995	Soldiers enter a Catholic church in Maliana and insult the priest	ABRI				Maliana	2	
184	2	217	8	9	1995	Youth in Dili burns largest market	Resistance				Dili	2	
185	2	219	15	11	1996	ABRI reported to have killed 10 people from the village of Waihulae and 4 from the nearby village of Samalari, near Viqueque	ABRI	Resistance			Viqueque	4	

1997

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
186	2	220	29	5	1997	Polling stations are atacked on elections for the Indonesian Parliament in Baucau, Quelicai, Viqueque, Ossu. Booths are also burnt down in Ermera and Bobonaro and hit by grenades in Liquiça	Resistance	ABRI			Baucau Quelicai Viqueque Ossu Ermera Bobonaro Liquiça	2	
187	2	220	7	6	1997	Market in Dili is burnt down.	Resistance				Dili	2	
188	2	220	11	6	1997	Indonesian army kills 12 civilian in Baucau	ABRI	Resistance			Baucau	2	
189	2	220	14	11	1997	Students are injured (8 seriously) and arrested in Dili after peacefull comemoration of St. Cruz Massacre	ABRI	Resistance			Dili	2	

1998

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
190	2	223	12	10	1998	Demonstrations in Dili, with people for Ermera and Liquiça and in Baucau with people from Baguia, Laga, Quelicai, Venilale and Vemasse.	Resistance				Dili Ermera Liquiça Baucau Laga Quelicai Venilale Vemasse	2	
191	2	223	24	10	1998	Attack by Indonesian army to villages in the district of Alas	ABRI				Alas	4	
192	3	127	13	11	1998	First attack by paramilitary militias: militia "Ablai" + ABRI attack catholic church of Alas in retaliation for Fretilin attack in Alas (Manufahi)	ABRI	Resistance			Alas	2	

1999

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
193	3	131	-	1	1999	Mahidi militia (Mati hindup dengen Indonesia) based in Cassa, Ainaro and leaded by the son of a local liurai attacks Suai church	ABRI	Resistance			Ainaro Suai	1	
194	2	224	24	2	1999	Pro-integration militias fire on pro-independence demonstrators in Dili	ABRI	Resistance			Dili	1	
195	2	224	8	3	1999	1600 refugess are reported to have fled the village of Sare near Hatolia, Ermera, after attacks by milita on the town of Guiso, near Maubara	ABRI	Resistance				1	
196	2	224	16	3	1999	Milita group Besi Mera Puthi attacks Carmelite Convent in Maubara.	ABRI					1	
197	2	224	4	4	1999	Militia groups attack the village of Dato, three kilometers west of Liquiça	ABRI					1	
198	2	224	6	4	1999	Militia attacks Liquiça church	ABRI					1	
199	2	225	9	5	1999	Militia spark riots in Dili	ABRI					1	
200	2	225	28	5	1999	Reports of Military control returning to Oecusse, Liquiça, Ainaro and Ermera	ABRI					1	
201	2	226	10	6	1999	Reports of Indonesian troops in Liquiça forcing people to vote in the 7/7 Indonesian Elections	ABRI					1	
202	2	226	7	7	1999	A convoy fo humanitarian aid in ermera is attacked by the Besi Merah Putih militia. A UNAMET convoy is attacked in Liquiça	ABRI					1	
203	2	226	28	8	1999	UN officials are threatened by milita in Maliana	ABRI					1	
204	2	226	29	8	1999	CNRT HQ in Pante-Makasar (Oecusse) is attacked by militia. CNRT offices in Dili and Lospalos are also destroyed	ABRI					1	
205	2	226	1	9	1999	Attacks on pro-independence supporters reported in Gleno, Ermera, aileu, Oecusse, Maliana and Dili	ABRI					1	
206	2	226	3	9	1999	UN staff abandons Maliana	ABRI					1	
207	2	226	4	9	1999	Referendum						1	
208	2	226	4	9	1999	Millitia attack in Maliana	ABRI					1	
209	2	226	5	9	1999	Millitia attack in Dili	ABRI					1	
210	2	226	8	9	1999	Millitia attack in Suai	ABRI					1	
211	2	226	10	9	1999	Millitia attack in Dili	ABRI					1	

#	Ref	Pg	D	M	Y	Event	Attacker	Defender	Region	District	Subdistrict	Control zone	Obs.
Information obtained from documental sources							Researcher's Interpretation						
212	2	226	19	9	1999	First UN troops leave Darwin to protect Timor	UN					1	
213	2	226	20	9	1999	First UN troops / peacekeeping forces arrive to Dili	UN					1	
214	2	226	20	9	1999	New militia coalition established at Balibó	ABRI					1	
215	2	226	23	9	1999	Leader of Aitarak militia calls for militia to be allowed control over area west of Dili	ABRI					1	
216	2	226	28	9	1999	Catholic workers killed by paramilitary in the road to Lospalos	ABRI					1	
217	*	226	-	-	1999	FALINTIL forces are stationed at Remexio, following referendum agreement	Resistance					1	
218	3	88	-	-	-	Population in Dili rose from 28.000 in 1975 to 67.039 in 1980.							

Legend:
Ref: (1) Taylor (1990); (2) Taylor (1999); (3) CAVR (2005)
Control zone: (1) Full control by Indonesian Army (ABRI); (2) Disputed control, under ABRI; (3) Contested control[109]; (4) Disputed control, under the Timorese Resistance; (5) Full control by the Timorese Resistance (FRETILIN/FALINTIL)

[109] In this analysis no rationale was found to assume at any time that a particular sub-district was completely contested, i.e., under neither the control of ABRI or the Timorese Resistance, even if disputed.

Appendix B - Chapter 2

Table 51: Primary Education Demand - Standard Models with Conflict 1: Average killings during life of the child – Instrumental Variable – First Stage

	(1) Individual, HH and local	(2) + Education as Investment	(3) Standard Model
	b/se	b/se	b/se
Constant	-30.466***	-30.830***	-32.184***
	(2.378)	(2.468)	(2.595)
Distance to border (instrument)	**-0.034*** **	**-0.033*** **	**-0.033*** **
	(0.006)	**(0.007)**	**(0.007)**
Female	0.006	0.006	0.016
	(0.140)	(0.140)	(0.141)
Age	7.984***	8.220***	8.223***
	(0.199)	(0.211)	(0.211)
Age^2	-0.360***	-0.371***	-0.371***
	(0.009)	(0.010)	(0.010)
Urban	-0.086	-0.050	-0.154
	(0.096)	(0.096)	(0.154)
Father Attended School	0.111	0.131	0.035
	(0.249)	(0.253)	(0.258)
Mother Attended School	-0.398	-0.393	-0.462
	(0.384)	(0.385)	(0.383)
Migrated	1.295**	1.299**	1.196**
	(0.539)	(0.530)	(0.518)
First Child	-0.080	-0.051	-0.070
	(0.155)	(0.155)	(0.155)
Adopted	-0.436	-0.402	-0.425
	(0.450)	(0.448)	(0.434)
Niece/Nephew	0.139	0.157	0.107
	(0.248)	(0.246)	(0.244)
Ln (Household Size)	-0.024	-0.008	0.192
	(0.160)	(0.158)	(0.204)
Share of boys 0-1	-0.653	-0.742	-0.424
	(0.935)	(0.930)	(0.947)
Share of boys 2-4	0.413	0.442	0.764
	(0.686)	(0.686)	(0.702)
Share of boys 5-9	1.770***	1.808***	1.966***
	(0.484)	(0.488)	(0.496)
Share of boys 10-14	-0.484	-0.451	-0.265
	(0.527)	(0.527)	(0.543)
Share of men above 65	1.113	1.053	1.316
	(1.232)	(1.224)	(1.237)
Share of girls 0-1	2.167**	2.090**	2.381**
	(1.023)	(1.024)	(1.037)
Share of girls 2-4	-0.398	-0.497	-0.371
	(0.687)	(0.684)	(0.686)
Share of girls 5-9	1.281***	1.313***	1.451***
	(0.490)	(0.488)	(0.493)
Share of girls 10-14	-0.282	-0.185	-0.083
	(0.514)	(0.512)	(0.513)
Share of women above 65	1.167	1.142	1.152
	(1.050)	(1.038)	(1.015)
Completed Years of Education by 2004/05		-0.094***	-0.121***
		(0.033)	(0.036)
E(Returns to Education)		-51.444***	-52.405***
		(10.704)	(10.451)
Average local wage		-0.064	-0.209
		(0.252)	(0.264)

Table 51: Primary Education Demand - Standard Models with Conflict 1: Average killings during life of the child – Instrumental Variable – First Stage (cont.)

	(1) Individual, HH and local	(2) + Education as Investment	(3) Standard Model
	b/se	b/se	b/se
Number of cows owned		0.002	-0.006
		(0.022)	(0.021)
Household had a loan denied		-0.077	0.049
		(0.239)	(0.251)
E (Per capita Monthly Household Income)			0.027*
			(0.015)
Average local education costs			-0.001
			(0.004)
Average local subsidies to education			0.001
			(0.010)
Average time to primary school			-0.003
			(0.004)
Insufficient Access			0.084
			(4.127)
Insufficient Quality			8.981
			(15.877)
Insufficient Security			9.925
			(16.963)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	6032	6032	6023
Pseudo R^2	0.724	0.726	0.726
Log-Likelihood	-15480.825	-15456.778	-15433.084
Sargan test			
F-Statistic	29.48	25.43	24.49
P-Value	0.0000	0.0000	0.0000
Wooldridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	-0.186***	-0.204***	-0.191***
Std. Dev.	(0.056)	(0.064)	(0.071)

* p<0.10, ** p<0.05, *** p<0.01

Table 52: Primary Education Demand - Conflict 1: Average killings during life of the child - Robustness to age of entry in school – cohort

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline model Cohort 6-14 years old		Cohort 7-14 years old		Cohort 8-14 years old	
	Probit	IV Probit	Probit	IV Probit	Probit	IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Conflict 1: Average killings during life	-0.023***	0.166**	-0.010	0.126*	0.016	0.063
	(0.007)	(0.071)	(0.008)	(0.066)	(0.016)	(0.061)
N	6022	6022	5256	5256	4450	4450
Log-Likelihood	-121425.64	-121698.40	-112748.88	-112789.51	-94630.62	-94656.07

* p<0.10, ** p<0.05, *** p<0.01

Table 53: Primary Education Demand - Conflict 1: Average killings during life of the child - Decomposition by Gender – First Stage

	(1) All Sample b/se	(2) Girls b/se	(3) Boys b/se
Constant	-32.184***	-25.697***	-31.278***
	(2.595)	(1.758)	(3.207)
Distance to border (instrument)	**-0.033*** **	**-0.031** **	**-0.033*** **
	(0.007)	**(0.013)**	**(0.008)**
Female	0.016	0.000	0.000
	(0.141)	(.)	(.)
Age	8.223***	7.976***	8.685***
	(0.211)	(0.276)	(0.283)
Age^2	-0.371***	-0.358***	-0.391***
	(0.010)	(0.013)	(0.013)
Urban	-0.154	-0.060	-0.264
	(0.154)	(0.228)	(0.243)
Father Attended School	0.035	0.047	-0.065
	(0.258)	(0.364)	(0.373)
Mother Attended School	-0.462	-0.384	-0.386
	(0.383)	(0.543)	(0.529)
Migrated	1.196**	1.791***	0.741
	(0.518)	(0.690)	(0.653)
First Child	-0.070	-0.069	-0.023
	(0.155)	(0.189)	(0.234)
Adopted	-0.425	-0.862	-0.166
	(0.434)	(0.713)	(0.415)
Niece/Nephew	0.107	0.020	0.041
	(0.244)	(0.327)	(0.412)
Ln (Household Size)	0.192	0.208	0.236
	(0.204)	(0.290)	(0.308)
Share of boys 0-1	-0.424	-0.177	-0.148
	(0.947)	(1.243)	(1.632)
Share of boys 2-4	0.764	1.714*	-0.398
	(0.702)	(0.951)	(1.113)
Share of boys 5-9	1.966***	-0.215	3.351***
	(0.496)	(0.727)	(0.715)
Share of boys 10-14	-0.265	0.757	-0.870
	(0.543)	(0.870)	(0.826)
Share of men above 65	1.316	0.632	1.599
	(1.237)	(1.780)	(1.641)
Share of girls 0-1	2.381**	0.271	4.690***
	(1.037)	(1.430)	(1.772)
Share of girls 2-4	-0.371	-1.124	0.129
	(0.686)	(1.049)	(1.047)
Share of girls 5-9	1.451***	1.482**	0.671
	(0.493)	(0.605)	(0.892)
Share of girls 10-14	-0.083	-0.779	1.305
	(0.513)	(0.737)	(0.871)
Share of women above 65	1.152	2.664**	-0.508
	(1.015)	(1.273)	(1.428)
Completed Years of Education by 2004/05	-0.121***	-0.095**	-0.135**
	(0.036)	(0.045)	(0.056)
E(Returns to Education)	-52.405***	-37.339***	-69.774***
	(10.451)	(13.382)	(12.764)
Average local wage	-0.209	0.003	-0.263
	(0.264)	(0.430)	(0.487)
Number of cows owned	-0.006	-0.016	0.014
	(0.021)	(0.019)	(0.051)
Household had a loan denied	0.049	-0.155	0.216
	(0.251)	(0.282)	(0.337)
E (Per capita Monthly Household Income)	0.027*	0.009	0.044*
	(0.015)	(0.020)	(0.023)

Table 53: Primary Education Demand - Conflict 1: Average killings during life of the child - Decomposition by Gender – First Stage (cont.)

	(1) All Sample b/se	(2) Girls b/se	(3) Boys b/se
Average local education costs	-0.001	-0.003	-0.000
	(0.004)	(0.007)	(0.006)
Average local subsidies to education	0.001	0.008	0.003
	(0.010)	(0.014)	(0.018)
Average time to primary school	-0.003	0.003	-0.008
	(0.004)	(0.006)	(0.007)
Insufficient Access	0.084	-3.225	2.964
	(4.127)	(6.644)	(6.955)
Insufficient Quality	8.981	12.821	11.439
	(15.877)	(23.387)	(26.342)
Insufficient Security	9.925	34.020	-10.466
	(16.963)	(24.714)	(27.939)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	6023	2941	3082
Pseudo R^2	0.726	0.740	0.724
Log-Likelihood	-15433.084	-7399.078	-7971.518
Sargan test			
F-Statistic	24.49	5.47	18.39
P-Value	0.0000	0.0195	0.0000
Wooldridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	-0.191***	-0.556	-0.619
Std. Dev.	(0.071)	(0.482)	(0.903)

* p<0.10, ** p<0.05, *** p<0.01

Table 54: Primary Education Demand - Conflict 1: Average killings during life of the child - Decomposition Urban / Rural – First Stage

	(1) All Sample b/se	(2) Urban b/se	(3) Rural b/se
Constant	-32.184***	-23.473***	-35.910***
	(2.595)	(3.195)	(1.814)
Distance to border (instrument)	**-0.033*** **	**-0.036*** **	**-0.025*** **
	(0.007)	**(0.008)**	**(0.003)**
Female	0.016	0.293*	-0.089
	(0.141)	(0.155)	(0.181)
Age	8.223***	7.619***	8.442***
	(0.211)	(0.228)	(0.275)
Age^2	-0.371***	-0.344***	-0.381***
	(0.010)	(0.012)	(0.013)
Urban	-0.154	0.000	0.000
	(0.154)	(.)	(.)
Father Attended School	0.035	0.173	-0.001
	(0.258)	(0.387)	(0.363)
Mother Attended School	-0.462	0.240	-0.865*
	(0.383)	(0.571)	(0.523)
Migrated	1.196**	1.074*	1.342*
	(0.518)	(0.613)	(0.812)
First Child	-0.070	-0.268	-0.026
	(0.155)	(0.184)	(0.199)
Adopted	-0.425	0.025	-0.470
	(0.434)	(0.723)	(0.513)
Niece/Nephew	0.107	-0.303	0.367
	(0.244)	(0.401)	(0.293)
Ln (Household Size)	0.192	-0.061	0.288
	(0.204)	(0.274)	(0.266)
Share of boys 0-1	-0.424	-0.435	-0.522
	(0.947)	(1.086)	(1.168)

Table 54: Primary Education Demand - Conflict 1: Average killings during life of the child - Decomposition Urban / Rural – First Stage (cont.)

	(1) All Sample b/se	(2) Urban b/se	(3) Rural b/se
Share of boys 2-4	0.764	0.017	1.152
	(0.702)	(1.029)	(0.881)
Share of boys 5-9	1.966***	1.995**	2.040***
	(0.496)	(0.806)	(0.601)
Share of boys 10-14	-0.265	-0.694	0.028
	(0.543)	(0.807)	(0.663)
Share of men above 65	1.316	-2.954*	2.297
	(1.237)	(1.672)	(1.460)
Share of girls 0-1	2.381**	2.646**	2.173*
	(1.037)	(1.271)	(1.290)
Share of girls 2-4	-0.371	0.318	-0.495
	(0.686)	(1.042)	(0.849)
Share of girls 5-9	1.451***	0.479	1.809***
	(0.493)	(0.666)	(0.619)
Share of girls 10-14	-0.083	-0.202	0.033
	(0.513)	(0.828)	(0.615)
Share of women above 65	1.152	0.567	1.086
	(1.015)	(1.837)	(1.106)
Completed Years of Education by 2004/05	-0.121***	-0.072	-0.131***
	(0.036)	(0.048)	(0.046)
E(Returns to Education)	-52.405***	-68.158***	-51.228***
	(10.451)	(18.895)	(11.312)
Average local wage	-0.209	0.100	-0.332
	(0.264)	(0.291)	(0.396)
Number of cows owned	-0.006	-0.020	-0.001
	(0.021)	(0.031)	(0.024)
Household had a loan denied	0.049	-0.949**	0.512*
	(0.251)	(0.370)	(0.292)
E (Per capita Monthly Household Income)	0.027*	-0.002	0.036*
	(0.015)	(0.021)	(0.019)
Average local education costs	-0.001	0.007	-0.007
	(0.004)	(0.005)	(0.007)
Average local subsidies to education	0.001	-0.033**	0.024*
	(0.010)	(0.015)	(0.014)
Average time to primary school	-0.003	-0.005	-0.002
	(0.004)	(0.006)	(0.004)
Insufficient Access	0.084	0.000	0.000
	(4.127)	(.)	(.)
Insufficient Quality	8.981	0.000	0.000
	(15.877)	(.)	(.)
Insufficient Security	9.925	0.000	0.000
	(16.963)	(.)	(.)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	6023	2787	3236
Pseudo R^2	0.726	0.685	0.737
Log-Likelihood	-15433.084	-6667.849	-8418.779
Sargan test			
F-Statistic	24.49	19.34	58.86
P-Value	0.0000	0.0000	0.0000
Wooldridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	-0.191***	-0.193*	-0.154
Std. Dev.	(0.071)	(0.113)	(0.218)

* p<0.10, ** p<0.05, *** p<0.01

Table 55: Primary Education Demand - Standard Models with Conflict 2: Extreme Killings Shock – Instrumental Variable – First Stage

	(1) Individual, HH and local	(2) + Education as Investment	(3) Standard Model
	b/se	b/se	b/se
Constant	-0.895***	-0.936***	-1.068***
	(0.132)	(0.135)	(0.149)
Distance to border (instrument)	**-0.002*** **	**-0.002*** **	**-0.002*** **
	(0.000)	**(0.000)**	**(0.000)**
Female	0.008	0.008	0.009
	(0.009)	(0.009)	(0.009)
Age	0.284***	0.309***	0.309***
	(0.015)	(0.016)	(0.016)
Age^2	-0.012***	-0.014***	-0.014***
	(0.001)	(0.001)	(0.001)
Urban	-0.011	-0.007	-0.015
	(0.008)	(0.008)	(0.011)
Father Attended School	-0.015	-0.013	-0.021
	(0.020)	(0.020)	(0.020)
Mother Attended School	-0.004	-0.002	-0.007
	(0.029)	(0.028)	(0.028)
Migrated	0.179***	0.180***	0.170***
	(0.047)	(0.047)	(0.047)
First Child	-0.003	0.001	-0.001
	(0.011)	(0.011)	(0.011)
Adopted	-0.046	-0.042	-0.045
	(0.037)	(0.037)	(0.036)
Niece/Nephew	0.026	0.030	0.025
	(0.020)	(0.020)	(0.020)
Ln (Household Size)	-0.012	-0.010	0.004
	(0.012)	(0.012)	(0.014)
Share of boys 0-1	-0.013	-0.025	0.002
	(0.067)	(0.066)	(0.067)
Share of boys 2-4	0.009	0.009	0.039
	(0.053)	(0.052)	(0.054)
Share of boys 5-9	0.084**	0.088**	0.101***
	(0.037)	(0.037)	(0.038)
Share of boys 10-14	0.038	0.039	0.056
	(0.040)	(0.040)	(0.041)
Share of men above 65	0.026	0.019	0.037
	(0.094)	(0.092)	(0.093)
Share of girls 0-1	0.198***	0.189***	0.220***
	(0.072)	(0.072)	(0.074)
Share of girls 2-4	-0.031	-0.041	-0.029
	(0.051)	(0.050)	(0.050)
Share of girls 5-9	0.049	0.051	0.065*
	(0.037)	(0.036)	(0.037)
Share of girls 10-14	0.040	0.050	0.058
	(0.040)	(0.040)	(0.040)
Share of women above 65	-0.002	-0.003	0.001
	(0.066)	(0.067)	(0.066)
Completed Years of Education by 2004/05		-0.010***	-0.012***
		(0.003)	(0.003)
E(Returns to Education)		-5.474***	-5.544***
		(1.003)	(0.985)
Average local wage		0.004	-0.006
		(0.028)	(0.029)
Number of cows owned		-0.001	-0.002
		(0.002)	(0.002)
Household had a loan denied		-0.024	-0.016
		(0.019)	(0.020)
E (Per capita Monthly Household Income)			0.002*
			(0.001)

Table 55: Primary Education Demand - Standard Models with Conflict 2: Extreme Killings Shock – Instrumental Variable – First Stage (cont.)

	(1) Individual, HH and local	(2) + Education as Investment	(3) Standard Model
	b/se	b/se	b/se
Average local education costs			0.000
			(0.000)
Average local subsidies to education			-0.001
			(0.001)
Average time to primary school			-0.000
			(0.000)
Insufficient Access			-0.110
			(0.216)
Insufficient Quality			0.999
			(1.193)
Insufficient Security			0.757
			(1.384)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	6032	6032	6023
Pseudo R^2	0.737	0.742	0.743
Log-Likelihood	564.423	621.381	625.365
Sargan test			
F-Statistic	75.07	64.51	58.93
P-Value	0.0000	0.0000	0.0000
Wooldridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	-5.234***	-5.050	-4.765***
Std. Dev.	(1.632)	(5.571)	(1.834)

* p<0.10, ** p<0.05, *** p<0.01

Table 56: Primary Education Demand - Conflict 2: Shock of extreme violence during life - Robustness to age of entry in school – cohort

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline model Cohort 6-14 years old		Cohort 7-14 years old		Cohort 8-14 years old	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Conflict 2: Shock of extreme violence during life	-0.402*** (0.112)	4.260** (1.831)	-0.186 (0.125)	22.268 (17.946)	-0.233 (0.242)	1.443 (1.396)
N	6022	6022	5256	5256	4450	4450
Log-Likelihood	-121308.848	-121698.394	-112727.728	-112789.508	-94633.188	-94656.066

* p<0.10, ** p<0.05, *** p<0.01

Table 57: Primary Education Demand - Conflict 2: Shock of extreme violence during life – Decomposition by Gender – First Stage

	(1) All Sample b/se	(2) Girls b/se	(3) Boys b/se
Constant	-1.068***	-0.829***	-1.100***
	(0.149)	(0.133)	(0.186)
Distance to border (instrument)	**-0.002*** **	**-0.003*** **	**-0.002*** **
	(0.000)	**(0.000)**	**(0.000)**
Female	0.009	0.000	0.000
	(0.009)	(.)	(.)
Age	0.309***	0.288***	0.339***
	(0.016)	(0.022)	(0.022)
Age^2	-0.014***	-0.013***	-0.015***
	(0.001)	(0.001)	(0.001)
Urban	-0.015	-0.011	-0.020
	(0.011)	(0.016)	(0.016)
Father Attended School	-0.021	-0.021	-0.029
	(0.020)	(0.032)	(0.022)
Mother Attended School	-0.007	-0.001	-0.004
	(0.028)	(0.041)	(0.031)
Migrated	0.170***	0.238***	0.115**
	(0.047)	(0.074)	(0.051)
First Child	-0.001	-0.013	0.012
	(0.011)	(0.014)	(0.016)
Adopted	-0.045	-0.083	-0.020
	(0.036)	(0.061)	(0.034)
Niece/Nephew	0.025	0.006	0.039
	(0.020)	(0.028)	(0.031)
Ln (Household Size)	0.004	0.013	0.004
	(0.014)	(0.022)	(0.021)
Share of boys 0-1	0.002	0.013	0.014
	(0.067)	(0.097)	(0.107)
Share of boys 2-4	0.039	0.128*	-0.060
	(0.054)	(0.075)	(0.079)
Share of boys 5-9	0.101***	0.033	0.160***
	(0.038)	(0.057)	(0.051)
Share of boys 10-14	0.056	0.040	0.044
	(0.041)	(0.065)	(0.059)
Share of men above 65	0.037	-0.020	0.075
	(0.093)	(0.132)	(0.120)
Share of girls 0-1	0.220***	0.077	0.373***
	(0.074)	(0.106)	(0.112)
Share of girls 2-4	-0.029	-0.052	-0.021
	(0.050)	(0.081)	(0.072)
Share of girls 5-9	0.065*	0.058	0.043
	(0.037)	(0.047)	(0.061)
Share of girls 10-14	0.058	0.050	0.108*
	(0.040)	(0.057)	(0.058)
Share of women above 65	0.001	0.120	-0.119
	(0.066)	(0.084)	(0.094)
Completed Years of Education by 2004/05	-0.012***	-0.011***	-0.014***
	(0.003)	(0.004)	(0.004)
E(Returns to Education)	-5.544***	-4.830***	-6.395***
	(0.985)	(1.374)	(1.240)
Average local wage	-0.006	-0.010	0.008
	(0.029)	(0.046)	(0.044)
Number of cows owned	-0.002	-0.001	-0.002
	(0.002)	(0.002)	(0.003)
Household had a loan denied	-0.016	-0.010	-0.019
	(0.020)	(0.030)	(0.026)
E (Per capita Monthly Household Income)	0.002*	0.002	0.002
	(0.001)	(0.002)	(0.002)

Table 57: Primary Education Demand - Conflict 2: Shock of extreme violence during life – Decomposition by Gender – First Stage (cont.)

	(1) All Sample b/se	(2) Girls b/se	(3) Boys b/se
Average local education costs	0.000	0.000	0.000
	(0.000)	(0.001)	(0.000)
Average local subsidies to education	-0.001	0.000	-0.001
	(0.001)	(0.001)	(0.001)
Average time to primary school	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
Insufficient Access	-0.110	-0.200	-0.045
	(0.216)	(0.344)	(0.341)
Insufficient Quality	0.999	1.359	0.913
	(1.193)	(1.769)	(1.862)
Insufficient Security	0.757	3.015	-1.748
	(1.384)	(2.046)	(2.177)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	6023	2941	3082
Pseudo R^2	0.743	0.749	0.746
Log-Likelihood	625.365	369.365	312.917
Sargan test			
F-Statistic	58.93	41.90	42.86
P-Value	0.0000	0.0000	0.0000
Woodridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	-4.765***	-6.473	-13.829
Std. Dev.	(1.834)	(5.530)	(20.431)

* p<0.10, ** p<0.05, *** p<0.01

Table 58: Primary Education Demand - Conflict 2: Shock of extreme violence during life - Decomposition Urban / Rural – First Stage

	(1) All Sample b/se	(2) Urban b/se	(3) Rural b/se
Constant	-1.068***	-0.298	-1.401***
	(0.149)	(0.216)	(0.128)
Distance to border (instrument)	**-0.002*** **	**-0.002*** **	**-0.003*** **
	(0.000)	**(0.000)**	**(0.000)**
Female	0.009	0.033**	-0.002
	(0.009)	(0.013)	(0.012)
Age	0.309***	0.192***	0.347***
	(0.016)	(0.023)	(0.020)
Age^2	-0.014***	-0.008***	-0.015***
	(0.001)	(0.001)	(0.001)
Urban	-0.015	0.000	0.000
	(0.011)	(.)	(.)
Father Attended School	-0.021	-0.008	-0.026
	(0.020)	(0.035)	(0.025)
Mother Attended School	-0.007	0.035	-0.034
	(0.028)	(0.046)	(0.032)
Migrated	0.170***	0.312***	-0.008
	(0.047)	(0.060)	(0.051)
First Child	-0.001	0.004	-0.008
	(0.011)	(0.016)	(0.013)
Adopted	-0.045	-0.020	-0.063
	(0.036)	(0.066)	(0.041)
Niece/Nephew	0.025	-0.033	0.045**
	(0.020)	(0.038)	(0.022)
Ln (Household Size)	0.004	0.005	0.004
	(0.014)	(0.021)	(0.018)
Share of boys 0-1	0.002	-0.022	0.065
	(0.067)	(0.092)	(0.080)

Table 58: Primary Education Demand - Conflict 2: Shock of extreme violence during life - Decomposition Urban / Rural – First Stage (cont.)

	(1) All Sample b/se	(2) Urban b/se	(3) Rural b/se
Share of boys 2-4	0.039	-0.042	0.106*
	(0.054)	(0.087)	(0.064)
Share of boys 5-9	0.101***	0.066	0.120***
	(0.038)	(0.070)	(0.044)
Share of boys 10-14	0.056	0.039	0.071
	(0.041)	(0.072)	(0.047)
Share of men above 65	0.037	-0.255*	0.160
	(0.093)	(0.142)	(0.105)
Share of girls 0-1	0.220***	0.211**	0.204**
	(0.074)	(0.105)	(0.086)
Share of girls 2-4	-0.029	0.027	-0.033
	(0.050)	(0.081)	(0.060)
Share of girls 5-9	0.065*	-0.047	0.103**
	(0.037)	(0.058)	(0.044)
Share of girls 10-14	0.058	0.075	0.063
	(0.040)	(0.076)	(0.044)
Share of women above 65	0.001	0.007	0.030
	(0.066)	(0.124)	(0.069)
Completed Years of Education by 2004/05	-0.012***	-0.011**	-0.010***
	(0.003)	(0.004)	(0.003)
E(Returns to Education)	-5.544***	-5.040***	-5.761***
	(0.985)	(1.685)	(1.140)
Average local wage	-0.006	0.007	-0.001
	(0.029)	(0.033)	(0.041)
Number of cows owned	-0.002	-0.002	-0.001
	(0.002)	(0.003)	(0.002)
Household had a loan denied	-0.016	-0.095**	0.025
	(0.020)	(0.038)	(0.019)
E (Per capita Monthly Household Income)	0.002*	0.001	0.002*
	(0.001)	(0.002)	(0.001)
Average local education costs	0.000	0.001	-0.000
	(0.000)	(0.000)	(0.000)
Average local subsidies to education	-0.001	-0.003**	0.002
	(0.001)	(0.001)	(0.001)
Average time to primary school	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Insufficient Access	-0.110	0.000	0.000
	(0.216)	(.)	(.)
Insufficient Quality	0.999	0.000	0.000
	(1.193)	(.)	(.)
Insufficient Security	0.757	0.000	0.000
	(1.384)	(.)	(.)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	6023	2787	3236
Pseudo R^2	0.743	0.658	0.766
Log-Likelihood	625.365	490.922	349.792
Sargan test			
F-Statistic	58.93	22.16	155.77
P-Value	0.0000	0.0000	0.0000
Woodridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	-4.765***	-3.801	-11.493
Std. Dev.	(1.834)	(2.313)	(10.392)

* p<0.10, ** p<0.05, *** p<0.01

Table 59: Variables

Variable	Source	Description
Attending School in 2004/05	TL-LSMS 2006	Binomial variable with 1 = reported to have attended school in the year 2004/05
Female	TL-LSMS 2006	Binomial variable with 1 = individual is a female
Age	TL-LSMS 2006	Individual's age
Age^2	TL-LSMS 2006	Square of the individual's age
Urban	TL-LSMS 2006	Binomial variable with 1 = household resides in an urban area
Father attended School	TL-LSMS 2006	Binomial variable with 1 = reported that father ever attended school
Mother attended School	TL-LSMS 2006	Binomial variable with 1 = reported that mother ever attended school
Migrated	TL-LSMS 2006	Binomial variable with 1 = residing in a district other than the one of birth
First child	TL-LSMS 2006	Binomial variable with 1 = is the oldest child in the household
Adopted	TL-LSMS 2006	Binomial variable with 1 = status in the household is "adopted"
Niece/Nephew	TL-LSMS 2006	Binomial variable with 1 = relation to household head is "niece" or "nephew"
Married	TL-LSMS 2006	Binomial variable with 1 = is married
Ln (Household Size)	TL-LSMS 2006	Logarithm of the number of members of the individual's household of residence
Share of boys 0-1	TL-LSMS 2006	Share of boys aged 0-1 in the household
Share of boys 2-4	TL-LSMS 2006	Share of boys aged 2-4 in the household
Share of boys 5-9	TL-LSMS 2006	Share of boys aged 5-9 in the household
Share of boys 10-14	TL-LSMS 2006	Share of boys aged 10-14 in the household
Share of men above 65	TL-LSMS 2006	Share of men aged above 65 in the household
Share of girls 0-1	TL-LSMS 2006	Share of girls aged 0-1 in the household
Share of girls 2-4	TL-LSMS 2006	Share of girls aged 2-4 in the household
Share of girls 5-9	TL-LSMS 2006	Share of girls aged 5-9 in the household

Variable	Source	Description
Share of girls 10-14	TL-LSMS 2006	Share of girls aged 10-14 in the household
Share of women above 65	TL-LSMS 2006	Share of women aged above 65 in the household
Completed Years of Education	TL-LSMS 2006	Equivalent number of years of schooling to the last completed level of education
E(Returns to Education)	TL-LSMS 2006(*)	Returns to education, calculated following Chapter 1 and using the survey data. The estimation uses a mincerian model, accounting for selection bias through the Heckman method. Using the model with the best fit, the estimated coefficients of the following correlates are used: completed years of education, dummy variable indicating having an NGO as employer, dummy variable indicating working in a rural public works project, yearly average number of civilians killed during school years of individual, number of years of extreme hunger experienced by individual while in school age. Estimates were produced using individual's own statistics. Values of dummy variables were equal to 1 if the individuals worked for the respective employer or substituted by the national probability of an individual working for the respective employer if they didn't.
Average local wage	TL-LSMS 2006(*)	Average hourly wage, calculated at the cluster/village level
Number of Cows Owned	TL-LSMS 2006	Number of cows owned by the household (proxy of credit worthiness)
Household had a loan denied	TL-LSMS 2006	Binomial variable with 1 = household had a loan denied in 2005
E (Per capita Monthly Household Income)	TL-LSMS 2006(*)	Estimated in a 2SLS Instrumental Variables approach (first step) using the remaining variables in the empirical model and the following instruments, representative of productive assets and wealth: years of education of the household head, controls for type of dwelling owned (bamboo house, semi-permanent, traditional house, small house in compound of main house, permanent house, emergency/tent, other), area of owned plot, value of owned plot, area of plots partly owned, variables indicative of the number of units of livestock owned (buffalos, bali cows, cows, horses, pigs, goats, sheep, chicken or ducks) and total value of the livestock.
Average local education costs	TL-LSMS 2006 (*)	Average expenditure on education, calculated at the cluster/village level
Average local subsidies to education	TL-LSMS 2006 (*)	Average external support received by the households, calculated at the cluster/village level
Average time to primary school	TL-LSMS 2006 (*)	Average of reported time to nearest primary school, calculated at the cluster/village level

Variable	Source	Description
Average time to secondary school	TL-LSMS 2006 (*)	Average of reported time to nearest secondary school, calculated at the cluster/village level
Insufficient Access	TL-LSMS 2006(*)	Percentage of children and youngsters, at the district level, that stated not to have attended school due to the school being too expensive, too far away, not fit for their eventual disabilities or due to language barriers
Insufficient Quality	TL-LSMS 2006(*)	Percentage of children and youngsters, at the district level, that stated not to have attended school due to lack of teacher, no supplies or dysfunctional school
Insufficient Security	TL-LSMS 2006(*)	Percentage of children and youngsters, at the district level, that stated not to have attended school due to harassment, stated insecurity or the fact that the children's household was displaced
Conflict 1: Average killings during life	CAVR (2006) (*)	Average number of people reported to have been killed or disappeared in the individual's district of birth during her life
Conflict 2: Shock of extreme violence during life	CAVR (2006) (*)	Binomial variable indicating whether the individual experienced a shock of extreme violence during her lifetime (corresponding to the 1999 post-referendum violence), equivalent to a number of killings in the district equal or above the yearly average of killings in each district and year of occupation in 2 standard deviations
Distance to border	Author's calculations from Google Maps	Distance of district capital to border (by road)
District fixed effects	TL-LSMS 2006	Control variables for the Timorese districts
Ethno-linguistic fixed effects	TL-LSMS 2006	Control variables for the Timorese ethno-linguistic groups

(*) Values calculated by the author, from the referred dataset.

Appendix C - Chapter 3

Table 60: Secondary Education Demand - Heckman Probit Regression - Second Stage

	(1)	(2)	(3)	(4)	(5)	(6)
				Marginal Effects		
	Probit	IV Probit	Heckman IV Probit	Probit	IV Probit	Heckman IV Probit
	b/se	b/se	b/se	b/se	b/se	b/se
Explained variable = Probability of adolescent between ages 12 and 18, to have attended secondary school in the 2004/05 school year						
Constant	-45.756***	-22.282***	-6.717			
	(7.081)	(6.793)	(4.786)			
Conflict: Shock of extreme violence during school life	**7.061*** (1.063)**	**26.398*** (10.117)**	**1.282* (0.715)**	**0.800*** (0.093)**	**3.899*** (1.366)**	**0.073* (0.040)**
Female	0.329**	0.256**	0.119	0.037**	0.038*	0.007
	(0.138)	(0.127)	(0.106)	(0.016)	(0.019)	(0.006)
Age	6.034***	3.021***	1.263**	0.683***	0.446***	0.072**
	(0.878)	(0.885)	(0.608)	(0.109)	(0.137)	(0.034)
Age^2	-0.181***	-0.087***	-0.043**	-0.020***	-0.013***	-0.002**
	(0.027)	(0.029)	(0.019)	(0.003)	(0.004)	(0.001)
Urban	-0.821***	-1.109***	-0.315**	-0.093***	-0.164***	-0.018**
	(0.243)	(0.247)	(0.142)	(0.027)	(0.033)	(0.008)
Father Attended School	0.028	-0.759*	-0.003	0.003	-0.112*	-0.000
	(0.508)	(0.456)	(0.313)	(0.058)	(0.066)	(0.018)
Mother Attended School	0.448	0.775*	0.715	0.051	0.114*	0.041
	(0.498)	(0.452)	(0.436)	(0.057)	(0.067)	(0.025)
Migrated	-0.360	-3.580**	0.290	-0.041	-0.529***	0.017
	(0.377)	(1.398)	(0.339)	(0.043)	(0.190)	(0.019)
First Child	0.419**	0.396**	0.224	0.047**	0.059**	0.013
	(0.187)	(0.182)	(0.139)	(0.021)	(0.026)	(0.008)
Adopted	-0.245	-0.744	0.390	-0.028	-0.110	0.022
	(0.919)	(0.800)	(0.564)	(0.104)	(0.117)	(0.032)
Niece/Nephew	-0.114	-0.181	0.023	-0.013	-0.027	0.001
	(0.224)	(0.237)	(0.211)	(0.025)	(0.035)	(0.012)
Married	-5.300***	-4.323***	-2.194**	-0.600***	-0.638***	-0.125**
	(0.660)	(0.550)	(0.918)	(0.070)	(0.081)	(0.052)
Ln (Household Size)	0.917***	0.656***	0.521**	0.104***	0.097***	0.030***
	(0.227)	(0.214)	(0.203)	(0.027)	(0.032)	(0.011)
Share of boys 0-1	2.961	0.043	1.889	0.335	0.006	0.108
	(2.008)	(2.176)	(1.412)	(0.232)	(0.321)	(0.081)
Share of boys 2-4	-3.002**	-4.722***	-2.311**	-0.340**	-0.697***	-0.132**
	(1.285)	(1.365)	(1.108)	(0.149)	(0.193)	(0.064)
Share of boys 5-9	-0.607	0.600	-0.517	-0.069	0.089	-0.029
	(1.004)	(0.964)	(0.760)	(0.115)	(0.141)	(0.043)
Share of boys 10-14	-0.954	0.289	0.108	-0.108	0.043	0.006
	(0.797)	(0.711)	(0.615)	(0.090)	(0.105)	(0.035)
Share of men above 65	-0.684	-1.055	-1.048	-0.077	-0.156	-0.060
	(1.415)	(1.293)	(1.084)	(0.159)	(0.190)	(0.062)
Share of girls 0-1	0.596	3.555*	-0.233	0.068	0.525**	-0.013
	(1.633)	(1.866)	(1.196)	(0.185)	(0.266)	(0.068)
Share of girls 2-4	-1.812	-4.058***	-1.052	-0.205	-0.599***	-0.060
	(1.714)	(1.441)	(1.111)	(0.193)	(0.207)	(0.064)
Share of girls 5-9	-1.561	-0.747	-0.525	-0.177	-0.110	-0.030
	(0.954)	(0.910)	(0.840)	(0.108)	(0.133)	(0.048)
Share of girls 10-14	0.553	0.332	-0.014	0.063	0.049	-0.001
	(0.843)	(0.756)	(0.666)	(0.095)	(0.112)	(0.038)
Share of women above 65	-1.355	1.987	-0.906	-0.153	0.293	-0.052
	(1.105)	(1.789)	(0.921)	(0.125)	(0.258)	(0.052)
Completed Years of Education	-0.712***	-1.036***	-0.343***	-0.081***	-0.153***	-0.020***
	(0.090)	(0.284)	(0.055)	(0.008)	(0.037)	(0.002)
E(Returns to Education)	497.255***	711.700***	119.932***	56.315***	105.105***	6.838***
	(65.788)	(235.455)	(23.938)	(5.273)	(31.243)	(1.315)
Average local wage	0.108	-0.055	-0.103	0.012	-0.008	-0.006
	(0.511)	(0.397)	(0.307)	(0.058)	(0.059)	(0.018)
Number of cows owned	0.025	-0.008	0.028	0.003	-0.001	0.002
	(0.016)	(0.031)	(0.020)	(0.002)	(0.005)	(0.001)

Table 60: Secondary Education Demand - Heckman Probit Regression - Second Stage (cont.)

	(1) Probit b/se	(2) IV Probit b/se	(3) Heckman IV Probit b/se	(4) ME Probit b/se	(5) ME IV Probit b/se	(6) ME Heckman IV Probit b/se
Household had a loan denied	(a)	(a)	7.209***	(a)	(a)	0.411***
	(a)	(a)	(0.313)	(a)	(a)	(0.035)
Per capita Monthly	0.011*	0.013**	0.005	0.001*	0.002**	0.000
Household Expenditure	(0.006)	(0.006)	(0.004)	(0.001)	(0.001)	(0.000)
Average local education	0.002	0.004	0.002	0.000	0.001	0.000
costs	(0.005)	(0.005)	(0.004)	(0.001)	(0.001)	(0.000)
Average local subsidies to	0.009	0.029	-0.004	0.001	0.004	-0.000
education	(0.017)	(0.021)	(0.018)	(0.002)	(0.003)	(0.001)
Average time to secondary	-0.006***	-0.008***	-0.005***	-0.001***	-0.001***	-0.000***
school	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Insufficient Access	-1.627	16.878*	9.969**	-0.184	2.493*	0.568**
	(7.172)	(9.138)	(4.547)	(0.811)	(1.291)	(0.262)
Insufficient Quality	-71.553***	-97.086***	-10.274***	-8.104***	-14.338***	-0.586***
	(25.475)	(20.843)	(3.688)	(2.973)	(3.035)	(0.209)
Insufficient Security	-25.298	-67.262***	1.053	-2.865	-9.933***	0.060
	(29.362)	(25.367)	(8.959)	(3.335)	(3.710)	(0.511)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1368	1368	4091	1368	1368	4091
N – uncensored	-	-	1396	-	-	1396
Pseudo R^2	0.5722	0.4405	-	-	-	-
Log-likelihood	-10639.567	-13916.608	-84604.710	-	-	-
Exogeneity test (H_0: athrho=0)						
χ^2 c			1.640	-	-	-
p-value			(0.200)	-	-	-

* p<0.10, ** p<0.05, *** p<0.01 Source: author's calculations on data from TLSLS (2007) and CAVR (2006) (a) perfectly predicts success.

Table 61: Secondary Education Demand – robustness to introduction of variables

	(1) Socio-economic		(3) + Education as Investment		(5) Standard Model	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
First stage						
Explained variable = Shock of extreme violence during school life						
Distance to border		-0.001**		-0.001*		-0.001**
(instrument)		(0.001)		(0.000)		(0.000)
Sargan test						
F-Statistic		4.87		3.73		4.93
P-Value		0.0274		0.0537		0.0266
Wooldridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual						
Residual		-1.338		-13.723***		95.304***
Std. Dev.		(1.788)		(2.442)		(19.869)
Second Stage						
Explained variable = Probability of adolescent, between ages 12 and 18, to have attended secondary school in the 2004/05 school year						
Conflict: Shock of	0.678***	0.745***	1.839***	-12.391***	1.815***	13.559***
extreme violence during	(0.136)	(0.142)	(0.280)	(3.383)	(0.275)	(2.771)
school life						
N	4099	4099	4099	4099	4099	4099
Log-Likelihood	-73418.114	-73643.023	-43872.768	-45004.380	-42225.329	-43496.579

* p<0.10, ** p<0.05, *** p<0.01. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Table 62: Secondary Education Demand - robustness to age of start

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline.		Start school at 7		Start school at 8	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Conflict: Shock of extreme violence during school life	1.815*** (0.275)	13.559*** (2.771)	0.824*** (0.197)	8.770*** (1.792)	0.401*** (0.155)	7.549*** (1.543)
N	4099	4099	4099	4099	4099	4099
Log-Likelihood	-42225.329	-43496.579	-42967.404	-43496.579	-43321.988	-43496.580

* p<0.10, ** p<0.05, *** p<0.01. Note: Coefficients of the conflict variables were estimated with the remaining covariates of the study's standard models. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Table 63: Secondary Education Demand - Robustness to age of entry in secondary school – cohort

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline model Cohort 12-18 years old		Cohort 13-19 years old		Cohort 14-20 years old	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Conflict: Shock of extreme violence during school life	1.815*** (0.275)	13.559*** (2.771)	1.632*** (0.266)	10.381*** (2.294)	1.344*** (0.329)	14.436*** (1.984)
N	4099	4099	3926	3926	3814	3814
Log-Likelihood	-42225.329	-43496.579	-52346.802	-53785.647	-59625.977	-60733.376

* p<0.10, ** p<0.05, *** p<0.01 . Note: Coefficients of the conflict variables were estimated with the remaining covariates of the study's standard models. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Table 64: Secondary Education Demand - robustness threshold of extreme violence

	(1)	(2)	(3)	(4)	(5)	(6)
	Threshold = +1 Standard Dev.		Baseline		Threshold = +3 Standard Dev.	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Conflict: Shock of extreme violence during school life	0.742*** (0.191)	5.455*** (1.115)	1.815*** (0.275)	13.559*** (2.771)	1.815*** (0.275)	13.559*** (2.771)
N	4099	4099	4099	4099	4099	4099
Log-Likelihood	-43077.004	-43496.579	-42225.329	-43496.579	-42225.329	-43496.579

* p<0.10, ** p<0.05, *** p<0.01. Note: Coefficients of the conflict variables were estimated with the remaining covariates of the study's standard models. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Table 65: Secondary Education Demand - robustness to migration

	(1)	(2)	(3)	(4)
	Baseline model		Non-Migrants	
	Probit b/se	IV Probit b/se	Probit b/se	IV Probit b/se
Conflict: Shock of extreme violence during school life	1.815*** (0.275)	13.559*** (2.771)	2.028*** (0.344)	19.028* (11.182)
N	4099	4099	3887	3887
Log-Likelihood	-42225.329	-43496.579	-39192.727	-40285.606

* p<0.10, ** p<0.05, *** p<0.01. Note: Coefficients of the conflict variables were estimated with the remaining covariates of the study's standard models. Source: author's calculations on data from TLSLS (2007) and CAVR (2006)

Table 66: Secondary Education Demand - decomposition by gender – First Stage

	(1) All Sample b/se	(2) Girls b/se	(3) Boys b/se
Constant	-0.251	-0.193	-0.280
	(0.359)	(0.635)	(0.414)
Distance to border (instrument)	**-0.001****	**-0.000**	**-0.001*****
	(0.000)	**(0.000)**	**(0.000)**
Female	0.001	0.000	0.000
	(0.008)	(.)	(.)
Age	0.061	0.033	0.080
	(0.043)	(0.072)	(0.053)
Age^2	-0.002	-0.001	-0.003
	(0.001)	(0.002)	(0.002)
Urban	0.012	0.034*	-0.005
	(0.012)	(0.018)	(0.016)
Father Attended School	0.025	0.031	0.030
	(0.026)	(0.037)	(0.028)
Mother Attended School	-0.006	0.029	-0.026
	(0.027)	(0.041)	(0.033)
Migrated	0.183***	0.221***	0.134***
	(0.045)	(0.052)	(0.046)
First Child	-0.004	0.009	-0.015
	(0.010)	(0.016)	(0.015)
Adopted	0.022	0.008	0.028
	(0.021)	(0.044)	(0.043)
Niece/Nephew	0.004	0.027	-0.016
	(0.021)	(0.026)	(0.027)
Married	-0.032	-0.067	0.394*
	(0.058)	(0.048)	(0.216)
Ln (Household Size)	0.006	0.020	-0.007
	(0.015)	(0.021)	(0.019)
Share of boys 0-1	0.129	0.002	0.192
	(0.141)	(0.155)	(0.167)
Share of boys 2-4	0.058	-0.111	0.180**
	(0.070)	(0.104)	(0.088)
Share of boys 5-9	-0.038	-0.056	-0.002
	(0.049)	(0.075)	(0.062)
Share of boys 10-14	-0.023	-0.035	-0.028
	(0.038)	(0.064)	(0.052)
Share of men above 65	0.013	-0.033	0.071
	(0.069)	(0.087)	(0.096)
Share of girls 0-1	-0.129	0.039	-0.284**
	(0.105)	(0.146)	(0.143)
Share of girls 2-4	0.086	0.160	-0.012
	(0.091)	(0.115)	(0.117)
Share of girls 5-9	-0.005	-0.131**	0.117*
	(0.047)	(0.065)	(0.066)
Share of girls 10-14	0.012	-0.042	0.093
	(0.046)	(0.058)	(0.071)
Share of women above 65	-0.129	-0.137	-0.110
	(0.088)	(0.113)	(0.099)
Completed Years of Education by 2004/05	0.023***	0.022***	0.023***
	(0.002)	(0.003)	(0.003)
E(Returns to Education)	-19.997***	-21.388***	-18.878***
	(1.705)	(3.257)	(1.793)
Average local wage	0.001	-0.019	0.021
	(0.027)	(0.044)	(0.034)
Number of cows owned	0.002	0.002	0.001
	(0.002)	(0.002)	(0.002)
Household had a loan denied	0.025	0.024	0.028
	(0.021)	(0.026)	(0.029)
Per capita Monthly Household Income	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Average local education costs	0.000	-0.000	0.001
	(0.000)	(0.000)	(0.000)
Average local subsidies to education	-0.001	-0.001	-0.001
	(0.001)	(0.002)	(0.001)
Average time to primary school	0.000	0.000*	0.000
	(0.000)	(0.000)	(0.000)

Table 66: Secondary Education Demand - decomposition by gender – First Stage (cont.)

	(1) All Sample b/se	(2) Girls b/se	(3) Boys b/se
Insufficient Access	-0.656**	-0.517	-0.907**
	(0.256)	(0.335)	(0.362)
Insufficient Quality	1.040	0.154	1.624
	(1.335)	(2.086)	(2.052)
Insufficient Security	1.445	-3.466	6.658***
	(1.709)	(2.582)	(2.392)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	4102	2001	2101
Pseudo R^2	0.749	0.752	0.761
Log-Likelihood	924.334	477.481	510.181
Sargan test			
F-Statistic	4.93	0.03	20.36
P-Value	0.0266	0.8646	0.0000
Wooldridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	95.304***	51.845***	522.059*
Std. Dev.	(19.869)	(10.188)	(268.681)

* p<0.10, ** p<0.05, *** p<0.01

Table 67: Secondary Education Demand - decomposition Urban / Rural – First Stage

	(1) All Sample b/se	(2) Urban b/se	(3) Rural b/se
Constant	-0.251	0.822*	-0.427
	(0.359)	(0.496)	(0.456)
Distance to border (instrument)	**-0.001****	**-0.000**	**-0.002****
	(0.000)	**(0.000)**	**(0.001)**
Female	0.001	0.015	-0.003
	(0.008)	(0.014)	(0.010)
Age	0.061	-0.063	0.136***
	(0.043)	(0.060)	(0.051)
Age^2	-0.002	0.002	-0.004***
	(0.001)	(0.002)	(0.002)
Urban	0.012	0.000	0.000
	(0.012)	(.)	(.)
Father Attended School	0.025	0.029	0.018
	(0.026)	(0.035)	(0.034)
Mother Attended School	-0.006	-0.036	0.011
	(0.027)	(0.045)	(0.035)
Migrated	0.183***	0.317***	-0.134**
	(0.045)	(0.036)	(0.056)
First Child	-0.004	-0.020	-0.003
	(0.010)	(0.019)	(0.012)
Adopted	0.022	-0.018	0.023
	(0.021)	(0.050)	(0.021)
Niece/Nephew	0.004	-0.013	-0.006
	(0.021)	(0.033)	(0.023)
Married	-0.032	-0.037	-0.055
	(0.058)	(0.158)	(0.047)
Ln (Household Size)	0.006	0.009	0.005
	(0.015)	(0.022)	(0.020)
Share of boys 0-1	0.129	0.174	0.224
	(0.141)	(0.184)	(0.140)
Share of boys 2-4	0.058	-0.034	0.109
	(0.070)	(0.117)	(0.081)
Share of boys 5-9	-0.038	-0.097	-0.022
	(0.049)	(0.082)	(0.056)
Share of boys 10-14	-0.023	-0.026	-0.005
	(0.038)	(0.060)	(0.047)
Share of men above 65	0.013	-0.051	0.038
	(0.069)	(0.095)	(0.081)

Table 67: Secondary Education Demand - decomposition Urban / Rural – First Stage (cont.)

	(1) All Sample b/se	(2) Urban b/se	(3) Rural b/se
Share of girls 0-1	-0.129	-0.264**	-0.062
	(0.105)	(0.134)	(0.131)
Share of girls 2-4	0.086	0.084	0.118
	(0.091)	(0.185)	(0.090)
Share of girls 5-9	-0.005	-0.087	0.027
	(0.047)	(0.075)	(0.058)
Share of girls 10-14	0.012	0.088	0.008
	(0.046)	(0.072)	(0.055)
Share of women above 65	-0.129	0.080	-0.124
	(0.088)	(0.160)	(0.081)
Completed Years of Education by 2004/05	0.023***	0.015***	0.026***
	(0.002)	(0.003)	(0.003)
E(Returns to Education)	-19.997***	-20.137***	-19.594***
	(1.705)	(2.297)	(1.966)
Average local wage	0.001	0.044*	-0.038
	(0.027)	(0.024)	(0.048)
Number of cows owned	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)
Household had a loan denied	0.025	0.044	0.027
	(0.021)	(0.034)	(0.027)
Per capita Monthly Household Income	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.001)
Average local education costs	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.001)
Average local subsidies to education	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.002)
Average time to primary school	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Insufficient Access	-0.656**	0.000	0.000
	(0.256)	(.)	(.)
Insufficient Quality	1.040	0.000	0.000
	(1.335)	(.)	(.)
Insufficient Security	1.445	0.000	0.000
	(1.709)	(.)	(.)
District fixed effects	Yes	Yes	Yes
Ethno-linguistic fixed effects	Yes	Yes	Yes
N	4102	2049	2053
Pseudo R^2	0.749	0.677	0.787
Log-Likelihood	924.334	466.722	555.115
Sargan test			
F-Statistic	4.93	1.31	5.40
P-Value	0.0266	0.2530	0.0203
Wooldridge Test of Endogeneity – Significance of Residual in regression with conflict variable and residual			
Residual	95.304***	-1.667	74.982***
Std. Dev.	(19.869)	(7.550)	(15.722)

* p<0.10, ** p<0.05, *** p<0.01

Table 68: Variables

Variable	Source	Description
Attending School in 2004/05	TL-LSMS 2006	Binomial variable with 1 = reported to have attended school in the year 2004/05
Female	TL-LSMS 2006	Binomial variable with 1 = individual is a female
Age	TL-LSMS 2006	Individual's age
Age^2	TL-LSMS 2006	Square of the individual's age
Urban	TL-LSMS 2006	Binomial variable with 1 = household resides in an urban area
Father attended School	TL-LSMS 2006	Binomial variable with 1 = reported that father ever attended school
Mother attended School	TL-LSMS 2006	Binomial variable with 1 = reported that mother ever attended school
Migrated	TL-LSMS 2006	Binomial variable with 1 = residing in a district other than the one of birth
First child	TL-LSMS 2006	Binomial variable with 1 = is the oldest child in the household
Adopted	TL-LSMS 2006	Binomial variable with 1 = status in the household is "adopted"
Niece/Nephew	TL-LSMS 2006	Binomial variable with 1 = relation to household head is "niece" or "nephew"
Married	TL-LSMS 2006	Binomial variable with 1 = is married
Ln (Household Size)	TL-LSMS 2006	Logarithm of the number of members of the individual's household of residence
Share of boys 0-1	TL-LSMS 2006	Share of boys aged 0-1 in the household
Share of boys 2-4	TL-LSMS 2006	Share of boys aged 2-4 in the household
Share of boys 5-9	TL-LSMS 2006	Share of boys aged 5-9 in the household
Share of boys 10-14	TL-LSMS 2006	Share of boys aged 10-14 in the household
Share of men above 65	TL-LSMS 2006	Share of men aged above 65 in the household

Variable	Source	Description
Share of girls 0-1	TL-LSMS 2006	Share of girls aged 0-1 in the household
Share of girls 2-4	TL-LSMS 2006	Share of girls aged 2-4 in the household
Share of girls 5-9	TL-LSMS 2006	Share of girls aged 5-9 in the household
Share of girls 10-14	TL-LSMS 2006	Share of girls aged 10-14 in the household
Share of women above 65	TL-LSMS 2006	Share of women aged above 65 in the household
Completed Years of Education	TL-LSMS 2006	Equivalent number of years of schooling to the last completed level of education
E(Returns to Education)	TL-LSMS 2006(*)	Returns to education, calculated following Chapter 1 and using the survey data.. The estimation uses a mincerian model, accounting for selection bias through the Heckman method. Using the model with the best fit, the estimated coefficients of the following correlates are used: completed years of education, dummy variable indicating having an NGO as employer, dummy variable indicating working in a rural public works project, yearly average number of civilians killed during school years of individual, number of years of extreme hunger experienced by individual while in school age. Estimates were produced using individual's own statistics. Values of dummy variables were equal to 1 if the individuals worked for the respective employer or substituted by the national probability of an individual working for the respective employer if they didn't.
Average local wage	TL-LSMS 2006(*)	Average hourly wage, calculated at the cluster/village level
Number of Cows Owned	TL-LSMS 2006	Number of cows owned by the household (proxy of credit worthiness)
Household had a loan denied	TL-LSMS 2006	Binomial variable with 1 = household had a loan denied in 2005

Variable	Source	Description
Per capita Monthly Household Expenditure	TL-LSMS 2006(*)	Sum of all expenditure items in the survey, in monthly terms and divided by the number of members of the household.
E (Per capita Monthly Household Income)	TL-LSMS 2006(*)	Estimated in a 2SLS Instrumental Variables approach (first step) using the remaining variables in the empirical model and the following instruments, representative of productive assets and wealth: years of education of the household head, controls for type of dwelling owned (bamboo house, semi-permanent, traditional house, small house in compound of main house, permanent house, emergency/tent, other), area of owned plot, value of owned plot, area of plots partly owned, variables indicative of the number of units of livestock owned (buffalos, bali cows, cows, horses, pigs, goats, sheep, chicken or ducks) and total value of the livestock.
Average local education costs	TL-LSMS 2006 (*)	Average expenditure in education, calculated at the cluster/village level
Average local subsidies to education	TL-LSMS 2006 (*)	Average external support received by the households, calculated at the cluster/village level
Average time to primary school	TL-LSMS 2006 (*)	Average of reported time to nearest primary school, calculated at the cluster/village level
Average time to secondary school	TL-LSMS 2006 (*)	Average of reported time to nearest secondary school, calculated at the cluster/village level
Insufficient Access	TL-LSMS 2006(*)	Percentage of children and youngsters, at the district level, that stated not to have attended school due to the school being too expensive, too far away, not fit for their eventual disabilities or due to language barriers
Insufficient Quality	TL-LSMS 2006(*)	Percentage of children and youngsters, at the district level, that stated not to have attended school due to lack of teacher, no supplies or dysfunctional school
Insufficient Security	TL-LSMS 2006(*)	Percentage of children and youngsters, at the district level, that stated not to have attended school due to harassment, stated insecurity or the fact that the children's household was displaced
Conflict: Shock of extreme violence during school life	CAVR (2006) (*)	Binomial variable indicating whether the individual experienced a shock of extreme violence while of school age and during the Indonesian occupation, equivalent to having lived through a year when the number of killings in the district was equal or above the yearly average of killings in each district and year of occupation in 2 standard deviations.
Distance to border	Author's calculations from Google Maps	Distance of district capital to border (by road)
District fixed effects	TL-LSMS 2006	Control variables for the Timorese districts
Ethno-linguistic fixed effects	TL-LSMS 2006	Control variables for the Timorese ethno-linguistic groups

(*) Values calculated by the author, from the referred dataset.